# 04/02/2014 - RFP No.: HSR13-57

## **California High-Speed Rail Authority**



RFP No.: HSR 13-57

# Request for Proposals for Design-Build Services for Construction Package 2-3

Reference Material, Part C.4
Geotechnical Data Report (GDR)

Sierra Subdivision Construction Package 2-3 Geotechnical Data Report

Ontario Airport

Riverside/Corona

Murrieta

Escondido

San Diego

January 2014

Sacramento

San Jose

Gilroy

Transbay Transit Center

Millbrae-SFO

(Potential Station)

Redwood City or Palo Alto

Stockton

Modesto

Merced

Fresno

Kings/Tulare

Bakersfield

Preliminary Engineering for Procurement (PE4P)
Record Set Submission
Fresno to Bakersfield
Sierra Subdivision
Construction Package 2-3
Geotechnical Data Report

Prepared by:

**URS/HMM/Arup Joint Venture** 

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### **List of Abbreviations**

ASTM ASTM International (formerly American Society for Testing and Materials)

Authority California High-Speed Rail Authority

bgs below ground surface

Caltrans California Department of Transportation
CDWR California Department of Water Resources
CEQA California Environmental Quality Act
CHSTP California High-Speed Train Project

CP Construction Package
CPT cone penetration test
EI expansion index
EL elevation

EPA US Environmental Protection Agency

FB Fresno to Bakersfield FID Fresno Irrigation District

GBR-B Geotechnical Baseline Report for Bid

GDR Geotechnical Data Report GI ground investigation

Gregg Drilling Gregg Drilling and Testing, Inc.

HMM Hatch Mott MacDonald

HSR high-speed rail

IBC International Building Code ICC International Code Council JPL Jet Propulsion Laboratory

MCE Maximum Considered Earthquake

MSL above mean sea level

NA not available

NAD83 1983 North American Datum

NAVD88 1988 North American Vertical Datum

NEHRP National Earthquake Hazards Reduction Program

NTD Notice to Designers

OBE Operating Basis Earthquake

PE4P preliminary engineering for procurement

PPDT pore pressure dissipation test

ppm parts per million

PS logging P- and S-wave suspension velocity logging

RC Regional Consultant (the URS/HMM/Arup joint venture and subconsultants)

R-value resistance base value SBT CPT soil behavior type

SBT<sub>N</sub> normalized CPT soil behavior type SCPT seismic cone penetration test

SJV San Joaquin Valley

SM Standard Methods for the Examination of Water and Wastewater

SPT standard penetration test

SR State Route T period

TM Technical Memorandum

TXCD triaxial consolidated drained compression
TXUU triaxial unconsolidated undrained compression

umhos micromhos

USCS Unified Soil Classification System USGS United States Geological Survey

 $V_{s30}$  average soil shear wave velocity in the upper 30 meters





### **Executive Summary**

The California High-Speed Train Project (CHSTP) will provide intercity high-speed rail (HSR) service throughout California's major population centers. The California High-Speed Rail Authority (Authority) has contracted a joint venture between URS, Hatch Mott MacDonald (HMM), and Arup to perform geotechnical engineering services in support of preliminary engineering for procurement (PE4P) for the portion of the project that extends between Fresno and Bakersfield.

This *Geotechnical Data Report* (GDR) presents findings from the ground investigation (GI) performed for PE4P pertaining to the Construction Package 2-3 (CP2-3) subsection of the alignment extending from E American Avenue south of the Fresno metropolitan area to 1 mile north of the border between Tulare County with Kern County. CP2-3 spans approximately 64 miles from Fresno County, crossing through the eastern side of Kings County and Hanford, entering Tulare County southeast of Corcoran, passing east of Alpaugh along State Route (SR) 43 and then moving to the west of the community of Allensworth. The GI included proposed exploration locations along the M, H, K4, C2, P, and A1 alignments (see Table 1.2-1 for alignment subsections).

No data were gathered in Kings County because encroachment and environmental health permits were not granted for the proposed environmental clearance and GI programs. As a result, no data were collected on proposed GI locations on the K4 alignment, which is contained wholly in Kings County.

The purpose of this report is to present the geotechnical data collected to date (including studies from the 15% design phase) and to support the Regional Consultant (RC) design team in future studies of the proposed improvements.

The GI for CP2-3 was performed in general conformance with Technical Memorandum (TM) 2.9.1 Geotechnical Investigation Guidelines (Rev 1, July 23, 2011), TM 2.9.2 Geotechnical Reports Preparation Guidelines (Rev 1, July 23, 2011), and Notice to Designers (NTD) R1 (February 17, 2011).

The RC conducted the GI program between August 19 and November 13, 2013 that consisted of 19 rotary-wash boreholes and 74 cone penetration tests (CPTs). The RC conducted the CP2-3 GI and CP4 GI concurrently, as access was made available to borehole locations. In general, soil samples were obtained at 5-foot intervals to the bottom of each borehole using standard penetration test (SPT) and California modified driven samplers, pushed Shelby tube samplers, and Pitcher barrel samplers. All samples were classified in accordance with the Unified Soil Classification System (USCS).

At the completion of drilling, standpipe piezometers were installed in five boreholes to monitor seasonal groundwater fluctuations; the remaining boreholes and all CPTs were backfilled with neat cement grout, in accordance with local permitting agency regulations.

Laboratory testing was performed on representative soil samples to obtain index and engineering properties. Geotechnical index testing included moisture content, No. 200 sieve wash, hydrometer, grain-size analysis, specific gravity, Atterberg limit, and organic content tests. Laboratory testing for engineering properties included direct shear, triaxial undrained and drained, consolidation, compaction, California Bearing Ratio, and corrosion test methods. Soil corrosivity was tested for by resistivity, pH, sulfate content, and chloride content methods.

In situ testing performed during the exploration program included standard penetration tests (SPTs), pocket penetrometer and torvane testing on retrieved samples, shear wave velocity measurements in select boreholes and CPTs, and pore water pressure dissipation tests in all 74 CPTs.





Section 1.0 Introduction

### 1.0 Introduction

### 1.1 Project Overview

In 1996, the state of California established the Authority. The Authority is responsible for studying alternatives to construct a rail system that will provide intercity HSR service on over 800 miles of track throughout California. This rail system will connect the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The Authority is coordinating the project with the Federal Railroad Administration. The CHSTP is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology that will include state-of-the-art safety, signaling, and automated train-control systems.

The statewide CHSTP has been divided into a number of sections for the planning, environmental review, coordination, and implementation of the project. This GDR is focused on the section of the CHSTP between Fresno and Bakersfield, specifically the CP2-3 subsection of the alignment extending from E American Avenue south of the Fresno metropolitan area to 1 mile north of the border between Tulare County with Kern County. During the initial planning process, the CHSTP alignment alternatives are dynamic and subject to revision.

### 1.2 Project Description

### 1.2.1 Fresno to Bakersfield High-Speed Rail Section

The proposed Fresno to Bakersfield (FB) Section of the HSR is approximately 114 miles long and traverses a variety of land uses, including farmland, large cities, and small cities. The FB Section includes viaducts and segments where the HSR will be at-grade or on embankment. The route of the FB Section passes by or through the rural communities of Bowles, Laton, Conejo, Armona, and Allensworth and the cities of Fresno, Hanford, Selma, Corcoran, Wasco, Shafter, McFarland, and Bakersfield.

The FB Section extends from north of Stanislaus Street in Fresno to the northern most limit of the Bakersfield to Palmdale Section of the HSR at Oswell Street in Bakersfield.

### 1.2.2 Alignments

The FB HSR Section is a critical link connecting the northern HSR sections of Merced to Fresno and the Bay Area to the southern HSR sections of Bakersfield to Palmdale and Palmdale to Los Angeles. The FB Section includes HSR stations in the cities of Fresno and Bakersfield, with a third station in the vicinity of Hanford. The Fresno and Bakersfield stations are this section's project termini.

The FB Section of the HSR is divided into 10 subsections, most of which have multiple alternative alignments. Table 1.2-1, Figure 1.2-1, and Figure 1.2-2 illustrate the subsections and their corresponding alignments.



**Table 1.2-1** FB Alignment Subsections

Alignment	Alignment	Location			/	
Prefix	Subsection Name	Begin	End	County	EIR/EIS Name*	
F1	Fresno	San Joaquin St	E Lincoln Ave	Fresno	BNSF	
M	Monmouth	E Lincoln Ave	E Kamm Ave	Fresno	BNSF	
Н	Hanford	E Kamm Ave	Iona Ave		BNSF (Hanford East)	
HW	Hanford West Bypass	E Kamm Ave	Idaho Ave	Fresno and	Hanford West Bypass 1 & 2	
HW2	Hanford West Bypass	E Kamm Ave	Iona Ave	Kings	Hanford West Bypass 1 & 2 Modified	
K1		Idaho Ave	Nevada Ave			Hanford West Bypass 2 (at-grade) (connects to C1 [Corcoran Elevated] or C2 [Corcoran Bypass])
K2		Idaho Ave	Nevada Ave		Hanford West Bypass 1 (at-grade) (connects to C3 [BNSF through Corcoran])	
К3		Iona Ave	Nevada Ave		BNSF (Hanford East) (connects to C3 [BNSF through Corcoran])	
К4	Kaweah	Iona Ave	Nevada Ave	Kings	BNSF (Hanford East) (connects to C1 [Corcoran Elevated] or C2 [Corcoran Bypass])	
K5		Iona Ave	Nevada Ave		Hanford West Bypass 2 Modified (below-grade) (connects to C1 [Corcoran Elevated] or C2 [Corcoran Bypass])	
K6		Iona Ave	Nevada Ave		Hanford West Bypass 1 Modified (below-grade) (connects to C3 [BNSF through Corcoran])	
C1	Corcoran	Nevada Ave	Ave 128	IX!»	Corcoran Elevated	
C2	Corcoran Bypass	Nevada Ave	Ave 128	Kings and	Corcoran Bypass	
C3	Corcoran	Nevada Ave	Ave 128	Tulare	BNSF (through Corcoran)	
Р	Pixley	Ave 128	Ave 84	Tulare	BNSF	
A1	Allensworth Bypass	Ave 84	Elmo Hwy	Tulare and	Allensworth Bypass	



**Table 1.2-1** FB Alignment Subsections

Alignment	Alignment Subsection	Location		County	EIR/EIS Name*	
Prefix	Name	Begin End		County		
A2	Through Allensworth	Ave 84	Elmo Hwy	Kern	BNSF (through Allensworth)	
L1		Elmo Hwy	Whisler Rd		Allensworth Bypass (connects to BNSF [through Wasco-Shafter])	
L2		Elmo Hwy	Poplar Ave	Kern	Allensworth Bypass (connects to Wasco- Shafter Bypass)	
L3	Poso Creek	Elmo Hwy	Whisler Rd		BNSF (through Allensworth) (connects to BNSF [through Wasco- Shafter])	
L4		Elmo Hwy	Poplar Ave		BNSF (through Allensworth) (connects to Wasco-Shafter Bypass)	
WS1	Through Wasco- Shafter	Whisler Rd	Hageman Rd	Kern	BNSF (through Wasco- Shafter)	
WS2	Wasco-Shafter Bypass	Poplar Ave	Hageman Rd	Kem	Wasco-Shafter Bypass	
B1	Bakersfield Urban	Hageman Rd	Baker St		BNSF (Bakersfield North)	
B2	Bakersfield Urban	Hageman Rd	Baker St	Kern	Bakersfield South	
В3	B3 Bakersfield Urban		Baker St		Bakersfield Hybrid	
*Environmental Impact Report/Statement						

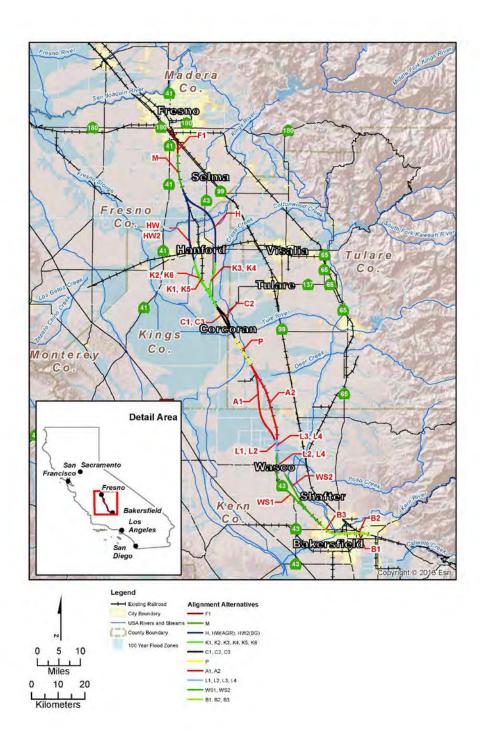


Figure 1.2-1
Overview of Alignments

CP2-3 spans approximately 64 miles traversing Fresno County alongside the BNSF railroad south of Fresno to Conejo then crossing through the eastern side of Kings County and Hanford and entering Tulare County southeast of Corcoran. South of Corcoran the alignment follows along the west side of SR 43 until it veers to the west at about Deer Creek. The alignment then passes about 1.25 miles west of Allensworth terminating 1 mile north of the Kern County line. The GI effort focused on the M, H, K4, C2, P, and A1 alignments within the limits of CP2-3, shown in color in Figure 1.2-2.

The CP2-3 alignment includes at-grade and embankment rail sections as well as bridges and viaducts. This contract also includes numerous secondary transverse vehicular and pedestrian bridges at select local street intersections. The design requires shallow and deep foundations, retaining walls, and earthwork embankments for the proposed improvements. The key project features are described in Table 1.2-2, from north to south. The table has been populated with the current 15% design structures, and is likely to change. Consult the structures reports for the most updated information.

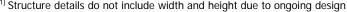
**Table 1.2-2**Summary of Significant Structures in CP2-3

Name	Approximate Start Station (ft)	Approximate End Station (ft)	Description of Location	Approximate Length <sup>[1]</sup>
At-grade	577+00	1086+00	From E American Ave to south of Willow Ave	50,600 ft
Retained	1086+00	1105+70	From south of Willow Ave to north of Conejo Ave	2,000 ft
Aerial	1105+70	1156+20	From north of Conejo Ave to south of Peach Ave	5,100 ft
Retained	1156+20	1173+50	From south of Peach Ave to north of Clarkson Ave	1,700 ft
At-grade	1173+50	1452+50	From north of Clarkson Ave to north of Highland Ave	27,900 ft
Retained	1452+50	1464+77	From north of Highland Ave to Highland Ave	1,200 ft
Bridge	1464+77	1467+90	From Highland Ave to Highland Ave	300 ft
Retained	1467+90	1479+68	From Highland Ave to north of Cole Slough	1,200 ft
Aerial	1479+68	1596+52	From north of Cole Slough to south of the Kings River	11,700 ft
Retained	1596+52	1622+50	From South of Kings River to north of Douglas Ave	2,600 ft
At-grade	1622+50	1885+40	From north of Douglas Ave to north of Fargo Ave	26,300 ft
Retained	1885+40	1903+57	From north of Fargo Ave to north of Grangeville Blvd	1,800 ft
Aerial	1903+57	2008+37	From north of Grangeville Blvd to south	10,500 ft



Table 1.2-2 Summary of Significant Structures in CP2-3

Name	Approximate Start Station (ft)	Approximate End Station (ft)	Description of Location	Approximate Length <sup>[1]</sup>	
			of SR 198		
Retained	2008+37	2023+48	From south of SR-198 to north of Hanford Armona Rd	1,500 ft	
At-grade	2023+48	2240+32	From north of Hanford Armona Rd to SR-43	28,700 ft	
Bridge	2240+32	2246+06	From SR-43 to SR-43	600 ft	
At-grade	2246+06	2436+00	From SR-43 to south of Tulare Ave	19,000 ft	
Retained	2436+00	2446+81	From south of Tulare Ave to south of Tulare Ave	1,100 ft	
Aerial	2446+81	2538+71	From south of Tulare Ave to SR-43	9,200 ft	
Retained	2538+71	2583+63	From SR-43 to SR-43	4,500 ft	
At-grade	2583+63	2966+50	From SR-43 to south of Ave 152	38,600 ft	
Retained	2966+50	2989+36	From south of Ave 152 to north of Ave 144	2,300 ft	
Aerial	2989+36	3046+02	From north of Ave 144 to Tule River	5,600 ft	
Retained	3046+02	3064+70	From Tule River to south of Ave 136	1,800 ft	
At-grade	3064+70	3982+20	From south of Ave 136 to north of Deer Creek	45,700 ft	
Retained	3982+20	4005+25	From north of Deer Creek to Deer Creek	2,300 ft	
Aerial	4005+25	4067+65	From Deer Creek to south of Stoil Spur	6,200 ft	
Retained	4067+65	4085+95	From south of Stoil Spur to south of Stoil Spur	1,800 ft	
At-grade	4085+95	4435+50	From south of Stoil Spur to north of Kern County Line	35,000 ft	
[1] Structure details do not include width and height due to ongoing design.					





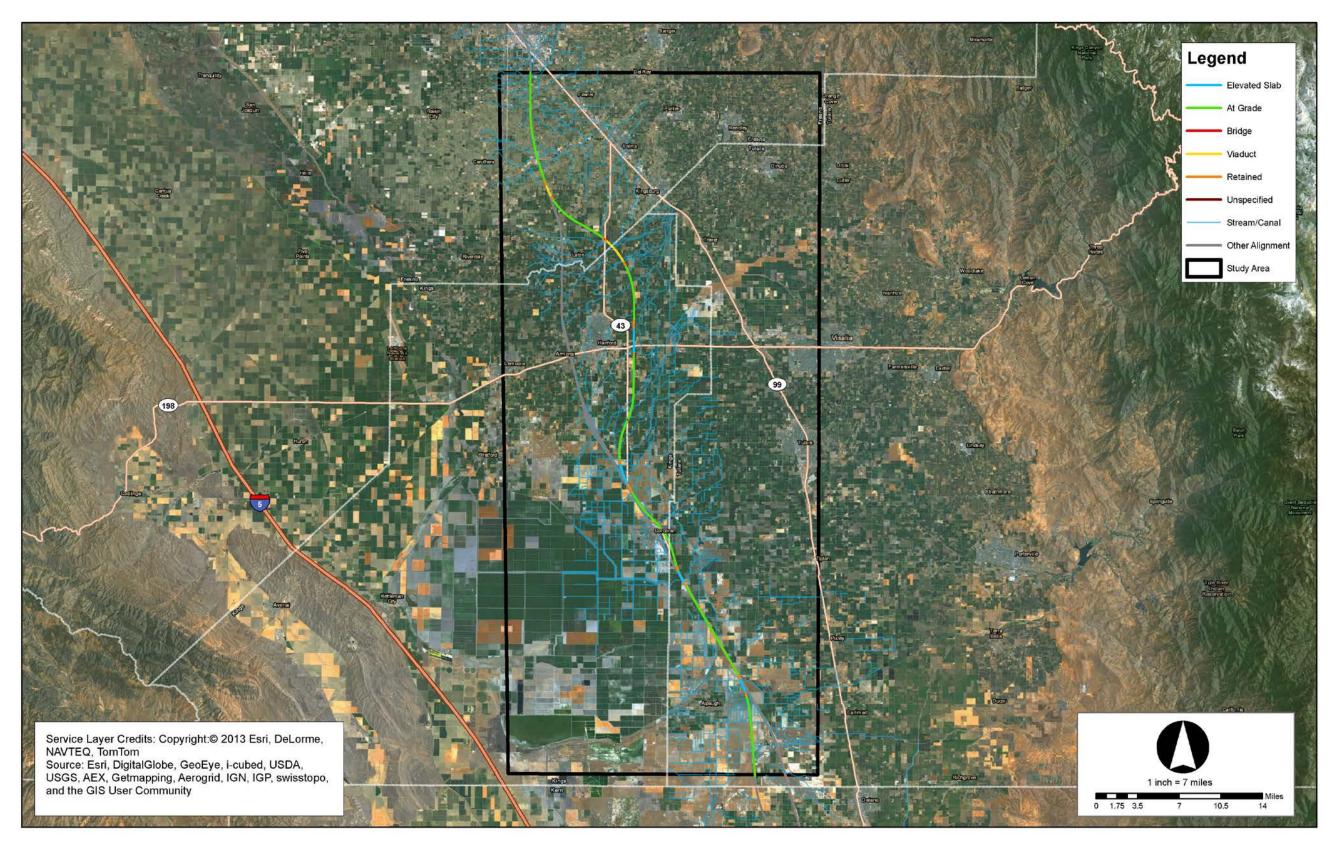


Figure 1.2-2 Site Vicinity Map





### 1.3 Purpose and Scope

### 1.3.1 Purpose

The purpose of the PE4P FB CP2-3 GDR is to present the geotechnical data collected to date (including studies from 15% design phase) and to support the Authority in the procurement of final design and construction contracts for the proposed improvements.

This report presents geotechnical data gathered in Fresno and Tulare Counties to aid in the following:

- Defining the lateral and vertical variability in subsurface soil conditions.
- Confirming the depth, seasonal, and spatial variability of groundwater.
- Supporting the development of a Geotechnical Baseline Report for Bid (GBR-B) for the procurement of CP2-3.

### 1.3.2 Scope

The RC performed a GI to obtain field and laboratory testing information on subsurface conditions to support the procurement of CP2-3. Supplementary surface and subsurface investigations will be required to support the final design and construction. In order to satisfy the project requirements, the subsurface investigation included the following:

- Boreholes at 19 locations to explore the subsurface stratigraphy, carry out in situ testing, and collect soil samples for visual classification and laboratory testing.
- Installation of five piezometers to monitor groundwater-level fluctuation.
- CPTs at 74 locations to supplement the boreholes, further explore the subsurface stratigraphy, and develop parameters for engineering analysis and design.
- Downhole P- and S-wave suspension velocity logging (PS logging) at three locations to confirm the soil site class and develop parameters for seismic design.
- Laboratory testing to characterize the major strata and develop parameters for engineering analysis and design.

The RC developed a detailed GI specification to prequalify GI and laboratory testing contractors for pricing. The team selected Gregg Drilling and Testing, Inc. (Gregg Drilling) as the recommended subcontractor to perform the PE4P FB GI work for the RC, and the Authority approved the selection. Laboratory testing was procured under a separate contract. The RC selected Inspection Services, Inc. and Technicon Engineering Services, Inc. to perform the geotechnical laboratory testing.

### 1.4 Available Data and Information

### 1.4.1 Project Sources

Available data and information for this report include data collected through desk studies, geotechnical reports prepared by the RC, and TMs prepared by the Authority and its representatives. Geotechnical reports previously prepared by the RC include the following:

• FB Geotechnical Data Report – Historical Borehole Data (URS/HMM/Arup 2012).



# • FB Draft Environmental Impact Report/Environmental Impact Statement (URS/HMM/Arup 2013a).

- FB Geology, Soils, and Seismicity Technical Report (URS/HMM/Arup 2011).
- FB Geologic and Seismic Hazards Report (URS/HMM/Arup 2013c).
- FB Geotechnical Investigation Work Plan for Preliminary Engineering for Procurement Design Packages 2-3 and 4 (URS/HMM/Arup 2013d).
- FB Water Quality/Hydrology Report (URS/HMM/Arup 2013e).

Available TMs, NTDs, and other information from the Authority and its representatives related to geotechnical and geological investigations, and geotechnical engineering pertinent to the preparation of this report include the following:

- TM 2.9.1 Geotechnical Investigation Guidelines (Authority 2011a).
- TM 2.9.2 Geotechnical Reports Preparation Guidelines (Authority 2011b).
- TM 2.9.3 Geologic and Seismic Hazard Analysis Guidelines (Authority 2011c).
- TM 2.9.10 Geotechnical Design Guidelines (Authority 2011d).
- TM 2.10.4 Seismic Design Criteria (Authority 2011e).
- NTD No. 01 Geotechnical Investigations for Preliminary Design, R1 (Authority 2011f).
- NTD No. 03 Preliminary Engineering (30% Design) Scope Revisions, R0 (Authority 2011g).
- NTD No. 08 Geotechnical Boring and Sample Identification, Handling and Storage Guidelines R0 (Authority 2011h).
- Interim 30% Design Spectra for FB (Authority 2011i).

### 1.4.2 Information from Other Sources

The RC collected available geotechnical data from historical projects near the study area as part of 15% geotechnical design efforts. The primary source of publicly available geotechnical data is the California Department of Transportation (Caltrans) collection of as-built construction records. Caltrans data are concentrated along SR 41, SR 43, and SR 99, from projects dating between 1953 and 1997. For each project, several boreholes were drilled, logged, and plotted on a cross section. None of the Caltrans records contain laboratory test data.

Borehole records collected from Caltrans extend to a maximum depth of 122 feet below ground surface (bgs). Of the 213 historical borings included in this report, 25 borings extend greater than 70 feet bgs. The average depth is 45 feet. Five historical Caltrans sites are within 0.5 miles of the alignment, most typically where the proposed railway alignment is in close proximity to the existing SR 43 alignment. The remaining locations included in our search are between 0.5 and 5 miles from the alignment. All relevant data from these records have been included as an attachment to this report in Appendix A.



### 1.5 Report Structure

The report begins with an Executive Summary, and Section 1 provides an introduction to the project including a project description, report purpose and organization, and a summary of available data and information. Sections 2, 3, and 4 describe the project setting through geology, seismicity, and hydrogeology, respectively. The GI program is described in Section 5, and the results of the laboratory testing program are summarized in Section 6. The report closes with a discussion of surface and subsurface conditions in Section 7 and limitations in Section 8. References are provided in Section 9.





Section 2.0 Physiography and Geologic Setting

### 2.0 Physiography and Geologic Setting

The section provides a brief description of the project physiography, geologic deposits, and seismicity, all of which are described in detail in the *FB Geologic Seismic and Hazards Report* (URS/HMM/Arup 2013c).

### 2.1 Physiography

The CHSTP FB alignment is in the south portion of the Great Valley Geomorphic Valley (commonly referred to as the San Joaquin Valley [SJV]). The topography of the Great Valley is relatively flat; it is bordered by the Pacific Coast Range to the west, the Klamath Mountains and Cascade Range to the north, the Sierra Nevada to the east, and San Emigdio and Tehachapi Mountains to the south.

Superimposed upon this large-scale, relatively flat topography is a localized topography caused by recent incisions of river systems. The subsequent topography comprises short, steep river/stream banks with channels at lower elevations relative to the surrounding areas. These channel bottoms range between wide, relatively flat-bottomed (with occasional rounded natural levees) and narrow gully-type valleys, depending on their age and the amount of flow. Along the CP2-3 alignment, these features appear to have been either channelized or redirected along more convenient routes to accommodate the present urbanization and agricultural land use.

The topography along the CP2-3 corridor is generally flat and varies between elevation (EL) 295 and 205 feet relative to the North American Vertical Datum of 1988 (NAVD88). Localized variations on the ground surface elevation occur at existing road embankments, detention basins, and other man-made features such as irrigation canals and road and rail crossings.

### 2.2 Geologic Setting

### 2.2.1 Regional Geology

The SJV comprises the southern part of the 450-mile-long Great Valley of California. It is an asymmetric structural trough that is filled with prism sediments up to 30,000 feet thick. It formed the southern part of an extensive forearc basin that evolved during the Cenozoic into today's hybrid intermontane basin. The SJV evolved through the gradual restriction of the marine basin due to uplift and emergence of the northern Great Valley in the late Paleogene, the closing off of the western outlets in the Neogene, and finally the sedimentary infilling in the Neogene and Quaternary. These sediments rest on crystalline basement rocks of the southwestward-tilted Sierran block.

Figure 2.2-1 shows a generalized cross-sectional schematic of the Great Valley deposits.

### 2.2.2 Geology along the Alignment

Surficial geology underlying the study area consists primarily of alluvial and lacustrine deposits of clay, silt, sand, and gravel with varying grain sizes and content. The soil type and consistency of these deposits vary by location. Figure 2.2-2 shows the surficial geology, and Table 2.2-1 provides a summary of information of the mapped surficial geology in the vicinity of the CP2-3 alignment.

Table 2.2-2 summarizes the prevalent geologic units anticipated to be encountered along the alignment from north to south based on Figure 2.2-3. South of E North Avenue there is a possibility of encountering sand dunes overlying the Modesto Formation. Aeolian sand dunes appear on some geologic maps but not others. Figure 2.2-4 shows the approximate extent of the



sand dunes (Page 1986). The sand dunes have been described to have a relief of about 5 to 20 feet and are associated with a group of surface depressions that trend southeast (CH2M Hill 2005).

**Table 2.2-1**Summary of Mapped Surficial Geologic Units

Map Symbol	Geologic Formation	Geologic Unit Type	Description	
Qsd	Recent sand dunes	Sand dunes	Cross-bedded, well-sorted medium to coarse sand as well as some very fine to fine sand and silt	
Qsc	Stream channel deposits	Alluvial deposits	Sediments along river channels and major streams; sand, gravel	
Qf	Modesto Formation	Recent alluvial fan deposits	Sediments deposited from highlands surrounding the Great Valley composed of granitic sand and silt	
Qb	Recent basin deposits	Basin deposits	Sediments deposited during flood stages of major streams in areas between natural stream levees and fans; silts and clays	
QI	Quaternary lake deposits	Lake deposits	Clay, silt, and fine sand of lake beds in former Tulare Lake	
Qc	Riverbank Formation	Pleistocene nonmarine sedimentary deposits	Older alluvium, slightly consolidated and dissected fan deposits composed of sand, gravel, and cobbles	
Sources: CDMG 1965 & 1966, Page 1986.				

**Table 2.2-2**Mapped Predominant Surficial Geologic Units by Area

Location	Predominant Unit*
South of Fresno to just south of Conejo	Sand dunes (Qsd) underlain by recent alluvial fan deposits (Qf- Modesto Formation)
South of Laton to north of Corcoran	Alluvial fan deposits (Qf-Modesto Formation)
Vicinity of Corcoran south to Allensworth	Lake deposits (QI) consisting of fine sand, silt, and clay
South of Allensworth	Alluvial fan deposits (Qf) and basin (Qb) deposits

Sources: CDMG 1965 & 1966, Page 1986.

Notes:

\*Geologic formations similar for all alternatives.

Qf (Modesto Formation) and Qc (Riverbank Formation) only identified by formational name on Fresno area geologic map, but not on the Bakersfield area geologic map (see Figure 2.2-2).



The Pleistocene formations that make up the alluvial fan sequence are the Modesto (Qf), Riverbank (Qc), and Turlock (Qp) Formations. These deposits make up the major surface and subsurface units and originate from stream channels emanating from the foothills to the east of the alignments. They are similar in mineralogy, deposition, and source and are shown stratigraphically on Figure 2.2-2.

The Modesto Formation occupies the highest stratigraphic position. Sediments within the Modesto Formation range in grain size from clay to gravel and seldom exhibit well-developed sedimentary structures. The Riverbank Formation underlies the Modesto Formation but does not differ greatly in lithology or texture. It is also characterized by the occurrence of a laterally extensive, but not pervasive, hardpan member that may be encountered at depth but is not likely to be encountered at the surface. The Modesto and Riverbank Formations are similar in four respects: (1) the parent material of the sand and silt fraction, (2) a tendency toward coarser material at the top of each geologic layer, (3) deposition as sequential overlapping alluvial terrace and fan systems, and (4) the origin of much of the sediment. Bedrock is about 6 miles bgs.

The Turlock Formation is the oldest unit exposed in the alluvial fan sequence and forms extensive subsurface deposits throughout the SJV. It contains the majority of the hydrologically important subsurface deposits along the alignment. However, it is unlikely this unit will be encountered during geotechnical studies for the HSR project due to its depth.

The southern section of the alignment is mapped within the former boundary of the Tulare Lake bed, QI (Quaternary lake deposit). USGS (1986) research indicates lacustrine and marsh deposits exist beneath the former lake bed, which "constitute a thick plug of clay and silt from which lenses of clay and silt emanate at irregular intervals [and] are in places greater than 3,600 feet thick." Six well-defined lenses of clay (designated "A" through "F") underlie the central part of the SJV. The Corcoran Clay member of the Tulare Formation (or "E" Clay) is the most well-known and extensive of these layers. This layer underlies the alignment at a depth of about 200 to 600 feet bgs.

Numerous natural braids and constrained channels of the Kings and Kaweah Rivers emanating from the Sierra Nevada to the east pass through the area and are still likely to be capable of causing floods during or after high-precipitation events in their watersheds. There are a number of major reservoirs and dams up slope of the site that could cause flooding if they are breached. In addition, there are a number of small ponds or reservoirs that may pose constraints to the project.

The area from Hanford to north of Corcoran is dominated by historical river channels trending typically northeast to southwest. An abundance of relict channels can be seen on historical aerial photography; they have subsequently been infilled or channelized to facilitate modern agricultural land. The geologic map of the Kings River indicates the area is underlain by Recent Great Valley fan deposits (Qf) and Recent Great Valley basin deposits (Qb). These deposits are likely to be of fluvial origin and composed of gravels, sands, silts, and clays with potentially significant units of hardpan and organic soils.



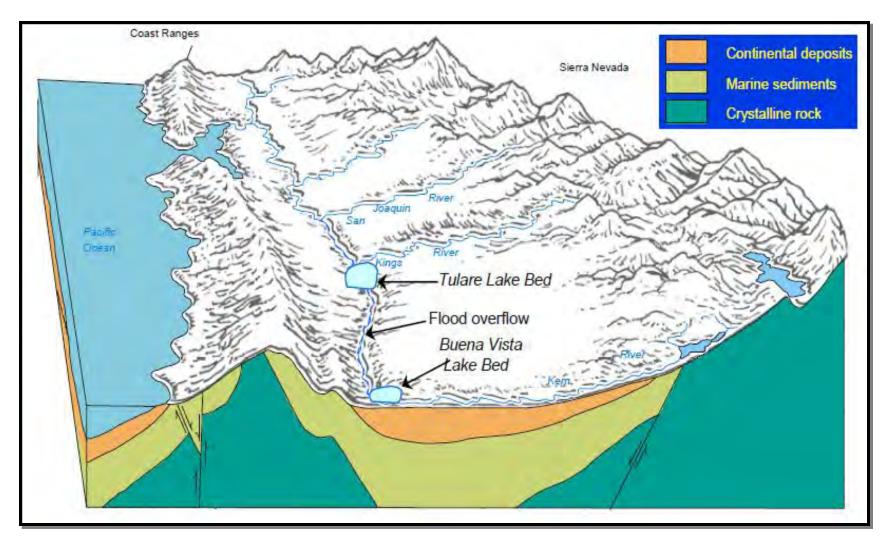


Figure 2.2-1
Cross Section of Great Valley Geomorphic Province (Page 1986)



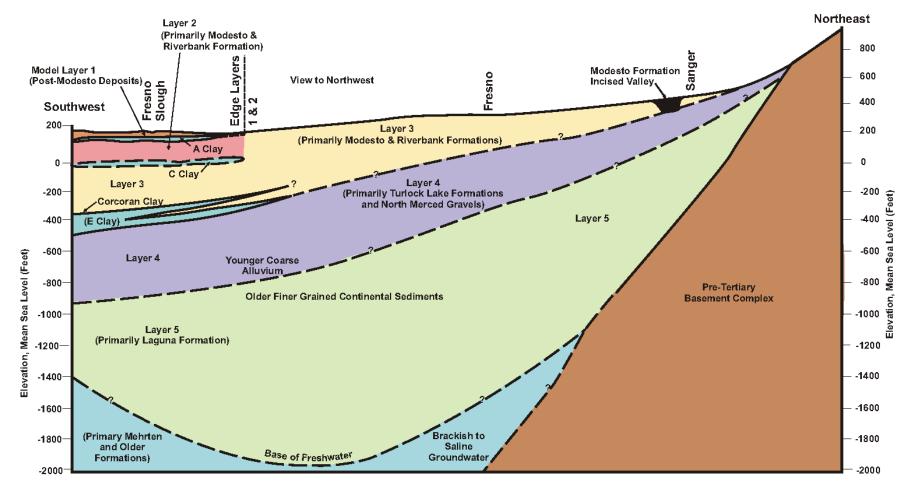


Figure 2.2-2
Geologic and Hydrogeologic Cross Section (Brown and Caldwell 2006)



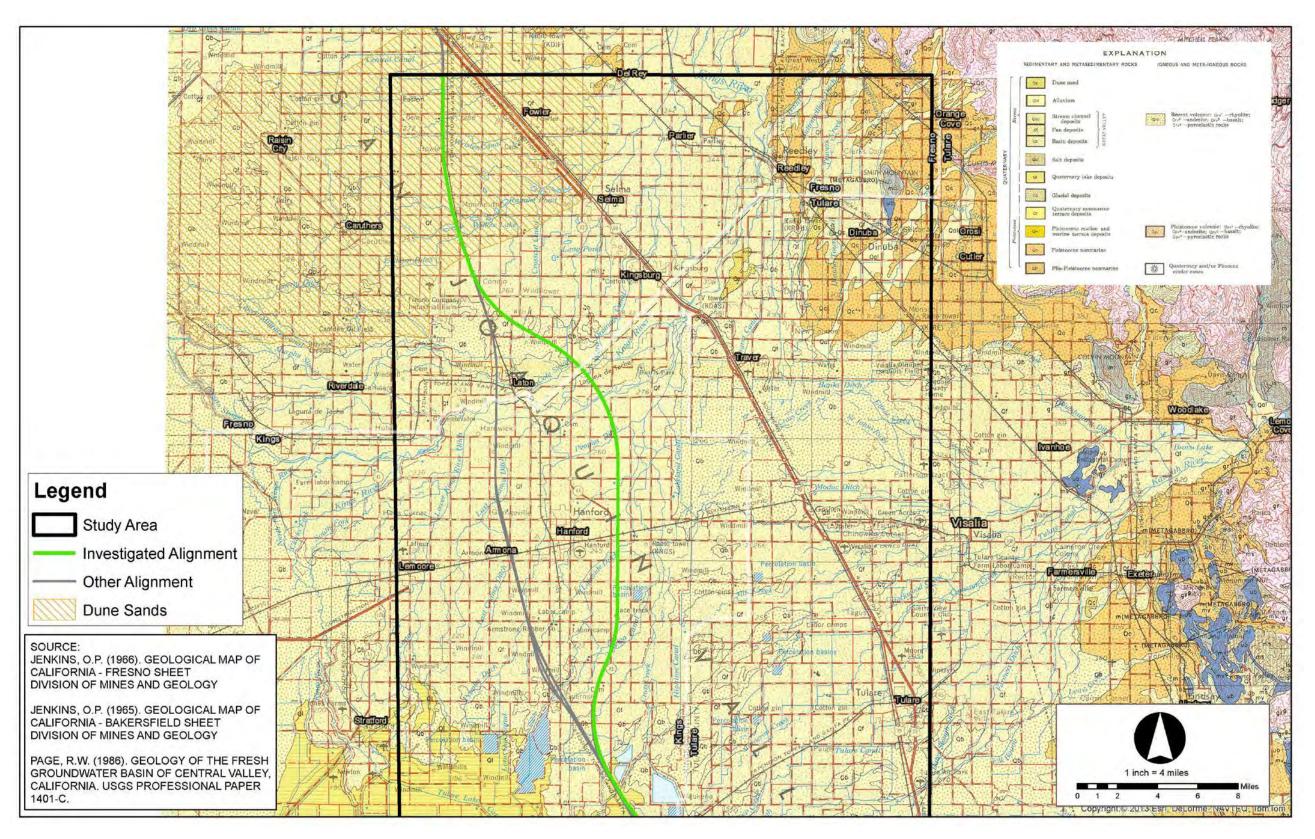


Figure 2.2-3
Local Geology in the Northern Half of the Study Area (Jenkins 1966 and Page 1986)





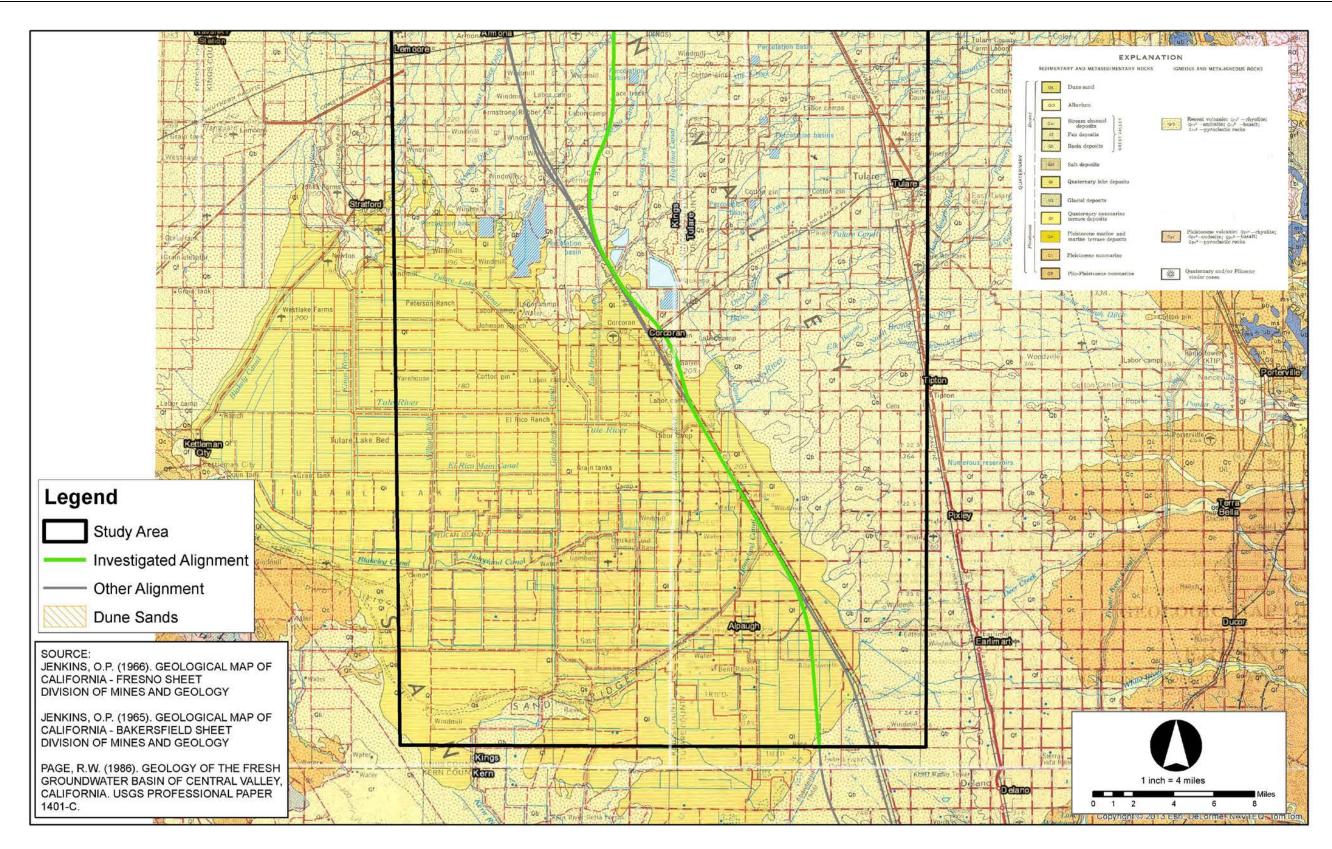


Figure 2.2-4
Local Geology in the Southern Half of the Study Area (Jenkins 1966 and Page 1986)





Section 3.0 Seismic Setting

# 3.0 Seismic Setting

# 3.1 General Seismic Setting

The study area is within a relatively seismically quiescent region between two areas of documented tectonic activity: the Coast Ranges-Sierran Block boundary zone to the east and the Pacific Coast Ranges boundary zone to the west.

The Coast Ranges-Sierran Block, which follows the physiographic boundary between the Coast Ranges and Great Valley geomorphic provinces, contains potentially active blind thrust faults (Unruh and Moores 1992). Based on the size of historical events and on the inferred subsection of the boundary zone, these blind thrust faults are capable of producing moderate to large earthquakes. The Pacific Coast Ranges contain many active faults that are associated with the northwest-trending San Andreas Fault System (Jennings 1994), which is the principal tectonic element of the North American/Pacific plate boundary in California.

In the SJV, seismic slip is partitioned onto subsidiary structures, such as the San Andreas, Garlock, and Great Valley Faults, which are distributed across the western boundary of Great Valley geomorphic province but not in close proximity to the study area.

# 3.2 Capable Faults

There are no known active faults crossing or within close proximity to the alignment within the study area. The San Andreas Fault, located approximately 45 miles west of the CP2-3 Alignment from the site, has the highest slip rate and is the most seismically active of any fault near the HSR alignment. The closest fault to the alignment is the Clovis Fault; the potential seismicity of this fault has not been characterized in the literature reviewed. While none cross the CP2-3 alignments, the San Andreas, White Wolf, Garlock, Kern Canyon, Edison, and Tehachapi Creek Faults are deemed "capable" by HSR standards [FB GSHR December 2013].

There are a number of other faults capable of producing large magnitude earthquakes near the HSR alignment. A list of known faults within 100 miles of the study area and their characteristics is presented in Table 3.2-1. These faults are shown in Figure 3.2-1 along with other mapped Quaternary faults in the vicinity of the study area.

**Table 3.2-1**Characteristics of Faults within 100 miles of the Study Area (USGS 2006)

Fault Name	Fault Name Fault Type		Distance and Bearing to FB HSR Alignment
San Andreas	Right-Lateral Strike-Slip	20–35	47 miles (or more) W of alignment
Great Valley (Segments 10-14)	Blind Thrust	1.5	25–35 miles (or more) W of alignment
Ortigalita	Right-Lateral Strike-Slip	0.5 to 1.5	64 miles W of Fresno
San Joaquin Reverse		-	57 miles W of Fresno, slightly E of Ortigalita Fault
O'Neill	'Neill Reverse		58 miles W of Fresno, slightly E of Ortigalita Fault
Nunez	-		48 miles W of Corcoran



Table 3.2-1 Characteristics of Faults within 100 miles of the Study Area (USGS 2006)

Fault Name	Fault Type	Slip Rate (mm/yr)	Distance and Bearing to FB HSR Alignment	
Foothills	Normal	0.1	90 miles NW of Fresno; 40 miles E of Stockton	
Round Valley/Hilton Creek	Normal	1	80 miles NE of Fresno	
Clovis Fault	-	_	12 miles E of near Clovis	
Corcoran Clay Fault Zone	Normal	-	Spanning across the HSR alignment from Hanford to the Kern/Tulare County line.	
Owens Valley	Right-Lateral Strike-Slip	1.5	85 miles E of alignment	
Kern Canyon	Normal	-	66 miles E of alignment at Hanford	
Kern Front	Normal	-	30 miles SE of Tule River Crossing	
Kern Gorge	Normal	=	14 miles NE of Bakersfield	
Buena Vista	Thrust	_	50 miles S of alignment	
Southern Sierra Nevada (Independence Section)	Normal	0.1	80 miles W of alignment	
Oil Field Fault Zone (North)*	Normal	-	2.25 miles N of alignment	
Oil Field Fault Zone (South)*	Normal	-	0.75 miles N of alignment	
Garlock	Left-Lateral Strike-Slip	2–10	34 miles SE of alignment	
White Wolf	Left-Lateral Reverse	3–8.5	13 miles SE of alignment	
Breckenridge	Normal	-	18 miles E of alignment	
Poso Creek/Pond	Normal	-	0/2 miles E of alignment	
Wheeler/Pleito	leito Normal		30 miles S of alignment	
Edison Fault Normal		-	Edison Fault Crossing is in Bakersfield and is discussed in Bakersfield to Palmdale alignment. Listed here for information.	
Southern Sierra Nevada (Haiwee Reservoir)	Normal	7–14	44 miles E of alignment	

<sup>\*</sup>These faults appear on the Caltrans 1996 Seismic Hazards Map but have apparently have been de-rated since they do not appear on the Caltrans 2007 Deterministic Peak Ground Acceleration Map.

Source: SCEC 1999, WGCEP 2007, Caltrans 2007, USGS, CGS 2010



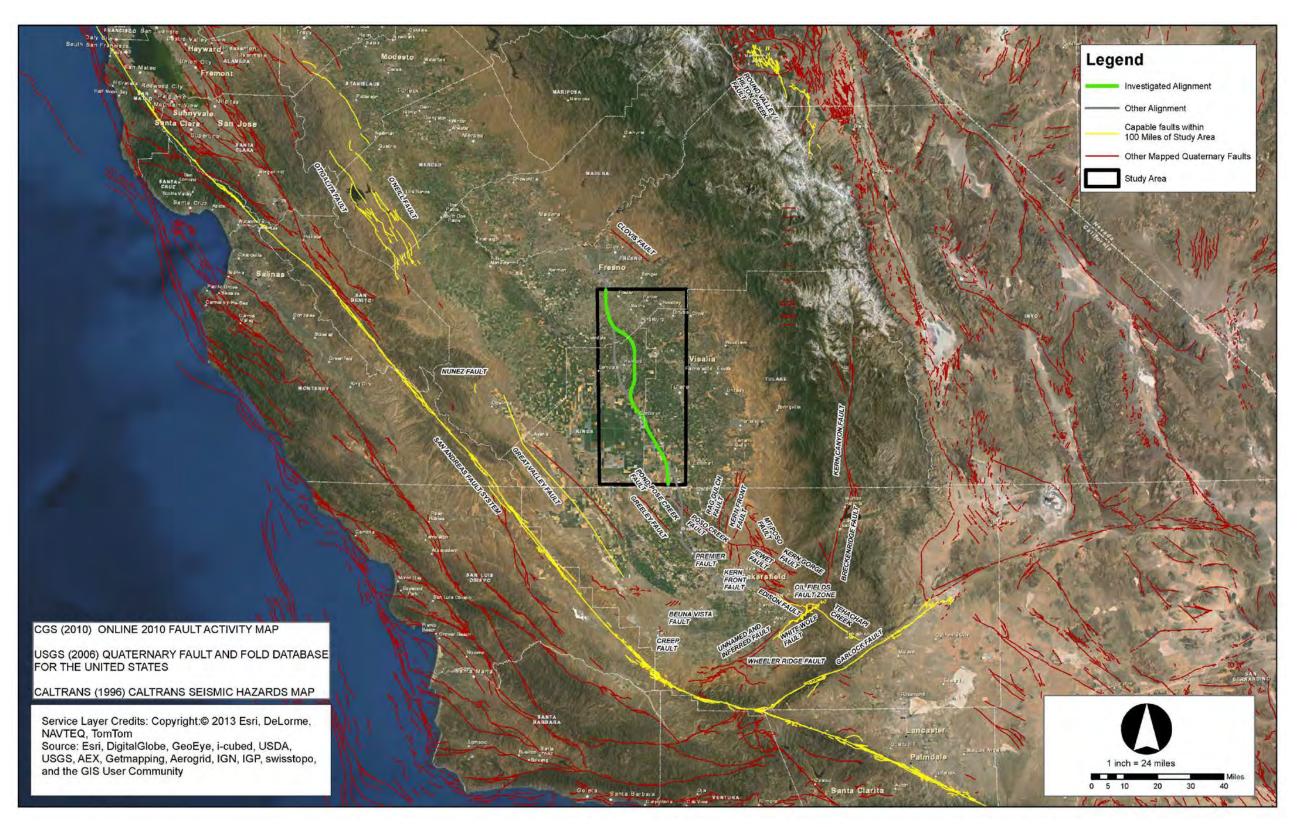


Figure 3.2-1
Mapped Faults in Vicinity of Study Area





# 3.3 Seismic Site Class

Seismic site classes have been defined under the National Earthquake Hazards Reduction Program (NEHRP) and are published in the International Building Code (IBC) and Table 3.3-1 below.

Table 3.3-1
NEHRP Site Class Definitions (ICC 2006)

Site Class <sup>[1]</sup>	Soil Profile Name	Average Properties in Upper 100 ft (~30 m) Shear Wave Velocity, V <sub>s30</sub>				
		ft/sec	m/sec			
А	Hard rock	V <sub>s30</sub> > 5,000	V <sub>s30</sub> > 1,524			
В	Rock	$2,500 < V_{s30} \le 5,000$	762 < V <sub>s30</sub> <u>&lt;</u> 1,524			
С	Very dense soil and soft rock	1,200 < V <sub>s30</sub> ≤ 2,500	366 < V <sub>s30</sub> ≤ 762			
D	Stiff soil profile	600 < V <sub>s30</sub> ≤ 1,200	183 < V <sub>s30</sub> ≤ 366			
Е	Soft soil profile	V <sub>s30</sub> < 600	V <sub>s30</sub> < 183			
<sup>[1]</sup> As defined in 2006 IBC Section 1613.5.5 (ICC 2006)						

# 3.4 Seismic Design Criteria

The system performance criteria approach uses design earthquakes to which HSR facilities are to be designed. As more devastating earthquakes have a lower probability of occurrence, design engineers frequently use a probabilistic approach to define earthquake hazard level. A "return period" identifies the expected rate of exceedance of a given ground motion level. In certain cases, the Authority and its representatives used deterministic methods to evaluate singular, severe earthquake scenarios based on faulting, site-to-source distance, and geologic conditions.

# 3.4.1 Design Earthquakes

Two design-level earthquakes are defined as follows in accordance with TM 2.10.4:

**Maximum Considered Earthquake (MCE)** – ground motions corresponding to greater of (1) a probabilistic spectrum based upon a 10% probability of exceedance in 100 years (i.e., a return period of 950 years) or (2) a deterministic spectrum based upon the largest median response resulting from the maximum rupture (corresponding to maximum moment magnitude) of any fault in the vicinity of the structure.

**Operating Basis Earthquake (OBE)** – ground motions corresponding to a probabilistic spectrum based upon an 86% probability of exceedance in 100 years (i.e., a return period of 50 years).



### 3.4.2 Performance Levels

At PE4P design, the MCE corresponds to the Non-Collapse Performance Level. The main objective is to limit structural damage to prevent collapse during and after an MCE. The OBE governs evaluation of the Operability Performance Level. The design objective for the Operability Performance Level is to ensure an elastic response (within structural deformation limits) to the OBE with no spalling.

# 3.5 Seismic Design Ground Motions

Procedures for defining the seismic design parameters for the HSR are defined in TM 2.10.4. The ground motion package for design will be provided by the Authority under a separate cover. Site specific shear wave velocity measurements are presented below in Section 5.



Section 4.0 Hydrogeologic Setting

# 4.0 Hydrogeologic Setting

# 4.1 Regional Cross Sections

The groundwater region that the HSR alignment passes through is known as the Tulare Lake Hydrologic Region. The hydrologic region is characterized by groundwater conditions that are artificially lowered, locally variable in quality and depth groundwater conditions and subject to increasing usage demands. Groundwater levels fluctuate with seasonal rainfall, withdrawal, and recharge. The large demand for groundwater has caused subsidence in some areas of the Valley, primarily along its western side and southern end. (CDWR 2003). Depth to groundwater in the SJV ranges from a few inches to more than 300 feet. "The project study area is within the SJV Groundwater Basin and crosses through five of its seven subbasins: Kings, Tulare Lake, Kaweah, Tule, and Kern" (FB Section: Hydrology and Water Resources Technical Report 2012).

According to the *FB Section: Hydrology and Water Resources Technical Report* (2012), the hydrogeologic cross section of the northern end of the CP2-3 alignment in the Kings Basin is shown on Figure 2.2-2. The regional groundwater flow direction in this area is from east to west. There are some localized influences as a result of pumping, surface water treatment, and groundwater recharge appurtenances. Historically, shallow groundwater levels have dropped as more water is abstracted than recharged (see Table 4.3-1 later in this section). Groundwater flow has increased and directions have changed in other parts of the valley due to pumping for irrigation, public supply, and recharge.

Figure 4.1-1 shows a generalized cross section of prevalent hydrogeologic conditions in the Tulare Lake Basin. Groundwater is the sole source of drinking water in the region. The current and potential uses of groundwater in the basin are municipal and domestic supply, industrial process supply, industrial service water supply, and agricultural water supply.



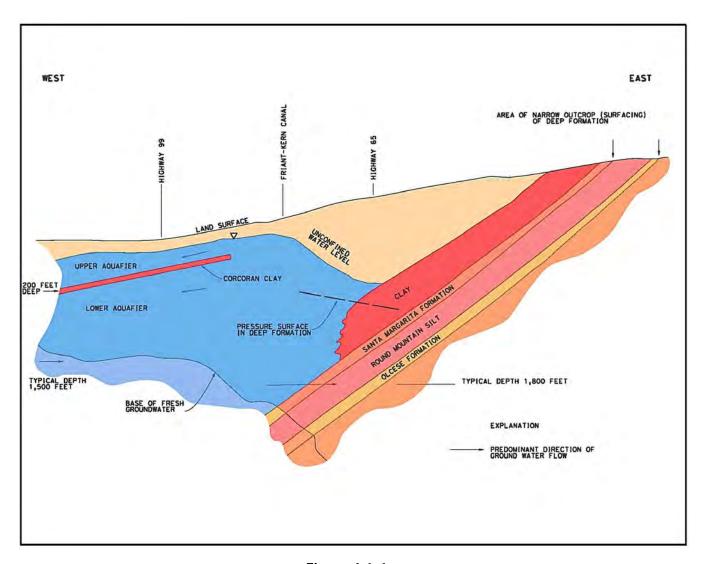


Figure 4.1-1
Tulare Lake Basin: Semi-Confined Aquifer (redrawn from Quinn 2007 and Schmidt 2001)



# 4.2 Major Aquitards

Interspersed within the unconsolidated deposits that comprise the useable aquifers in the region are a number of clay layers that can act as confining beds. Extensive, low-permeability soils that isolate the upper aquifers from the lower aquifers may exist throughout Kings County where a pervasive very shallow perched groundwater condition is known to exist. Perched groundwater is known to exist in the Hanford area and was generally encountered from south of Corcoran to the southern terminus of the CP2-3 study area.

The aquitard that has greatest significance is known as the Corcoran Clay (E-Clay). The Corcoran Clay underlies the alignment from just south of Kings River Complex to beyond the southern terminus of CP2-3. In this area, the results of previous studies indicate the Corcoran Clay is up to 120 feet thick and its depth varies from about 200 feet to 600 feet below the existing ground surface (USGS 1986).

# 4.3 Regional Groundwater Levels

#### 4.3.1 Historical Groundwater Levels

Table 4.3-1 summarizes the historical groundwater levels along the alignment over the past 50 years according to various sources at the California Department of Water Resources (CDWR 2011a) website, including groundwater wells along the alignment.

Table 4.3-1
Groundwater Table Depths (CDWR 2011b)

	Fortally or	Period						
Location	Existing Grade	1960–65	1984–88	1998– 2001	2005	2009–11		
East Morton Avenue	289	29	26	32	52	63		
Bowles	275	33	34	52	65	76		
Conejo	261	36	41	59	81	90		
East Davis Street	258	38	26	43	63	76		
Denver Avenue	275	22	23	29	60	83		
Dover Avenue	265	27	25	47	70			
Excelsior Avenue	264	24	44	68	82			
Elder Avenue	265	45	43	72	96	102		
Flint Avenue	260	50	60	88	107	115		
Fargo Avenue	257	67	66	95	112	125		
Grangeville Blvd	250	50	70	95	125	130		
Lacey Blvd	248	83	73	88	110			
Iona Avenue	240	80	80	97	144	152		
Idaho Avenue	232	77	50	85	129	144		



Period **Existing** Location 1998-Grade 1960-65 1984-88 2009-11 Kansas Avenue Lansing Avenue Nevada Avenue Corcoran Avenue 144 Tule River Avenue 128 Avenue 112 Avenue 88 Deer Creek Allensworth Avenue 24 

Table 4.3-1
Groundwater Table Depths (CDWR 2011b)

The FB Geologic and Seismic Hazards Report (URS/HMM/Arup 2013a) shows a general trend of groundwater fluctuation along the HSR alignment. All of the groundwater levels identified above are approximate, subject to seasonal fluctuations, and likely more representative of mean low conditions. The published groundwater table depths are for the unconfined aquifer and take no account of localized high-level perched groundwater tables, deeper confined aquifers, or potentially artesian or subartesian groundwater conditions.

#### 4.3.2 Current Groundwater Levels

K/T County Line

Groundwater levels measured during this investigation are shallower that the measurements shown in Table 4.3-1 for the period between 2009 and 2011, but they are within the range of measurements shown for other historical periods.

In general, the results of our observations and measurements in boreholes and CPTs in Fresno County indicate the groundwater depths increase to the south. Between Jefferson Avenue and Manning Avenue, groundwater is generally between 40 and 80 feet bgs; between Manning Avenue and Davis Avenue, the results of our investigation indicates it drops to between 80 and 105 feet bgs and is deepest near Conejo; south of Davis Avenue to the Kings County line, the groundwater table fluctuates slightly but generally rises to the south. Our observations and measurements in this area indicate groundwater is between about 50 and 90 feet (shallower near the Kings River).

In Tulare County, the results of our studies indicate groundwater levels are generally between 20 and 50 feet. In the vicinity of Avenue 56, where large percolation ponds are present, the



results of pore pressure dissipation tests in the CPTS indicated the water table can be as shallow as between 5 and 10 feet. Shallow measurements and observations of perched groundwater was generally noted between Avenue 88 in Tulare County and the Kern County line, at depths varying from about 5 to 15 feet.

The results of geophysical testing indicate perched groundwater may be present between 65 and 70 feet in borehole S0028R (in Conejo) and between 32 feet and 45 feet in borehole S0067R at Avenue 144 in Tulare County. The results of geophysical tests are presented in Appendix D.

Current groundwater measurements and observations have not yet been performed for sections of the alignment within Kings County. The historical measurements shown in Table 4.3-1 indicate the range in depth to the groundwater may vary from about 20 feet to more than 100 feet bgs.

The results of our current groundwater measurements and observations are presented in Sections 5.3.5 and 5.5.

# 4.3.3 Groundwater Chemistry

Groundwater chemistry is discussed in detail in the GSHR (URS/HMM/Arup 2013a). Percolation of agricultural runoff has increased levels of nitrates, pesticides, and herbicides in shallow groundwater in the SJV. The natural groundwater already contains elevated bicarbonate ( $HCO_3$ ) ions in runoff from the Sierra Nevada to the east and elevated sulfates ( $SO_4$ ) from runoff from the Coast Ranges to the west. Both ions relate to the soil's potential for corrosion of buried concrete and steel. Groundwater chemistry data collection and testing are discussed in this report in Section 6.10.

# 4.4 Land Subsidence

The FB Geologic and Seismic Hazards Report (2013c) discusses regional subsidence in detail. The areas of subsidence identified by researchers at the Jet Propulsion Laboratory (JPL 2013) indicate subsidence along the alignment during a period of observation between June 2007 and December 2010. The color-gradient contours on Figure 4.4-1 show the limits and rates of subsidence identified by JPL along the alignment options (multi colored and labeled). These are superimposed on the Corcoran Clay Fault Zone (red lines) for reference. California DWR well number 20S21E36Q002M is located at the red dot.

The color gradient contours represent the rate that subsidence is occurring, which is expressed along a section shown on the inset. One color gradient (blue to blue) represents 12 cm/year of subsidence and the rate is highest in the center of the bowl.

The fringes of this bowl extend from just north of Hanford south to town of Allensworth (located on SR 43 about 6 miles west of Earlimart). For reference, on the inset, the P alignment extends from -5 km to 0 km on the black dashed section line. The inset on Figure 4.1-1 shows that along the proposed P alignment subsidence occurred at nearly 22 cm/year (9 inches/year), during the period of observation. The figure indicates similar subsidence rates north and south of Corcoran with a small bowl centered about 1.67 miles northeast of the C3 alignment (JPL 2014).



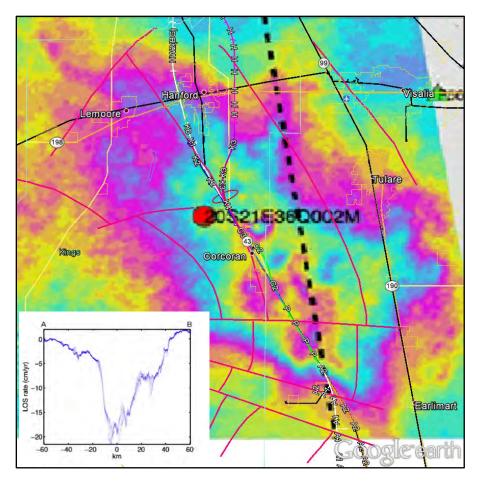


Figure 4.4-1
Subsidence Color Gradient with Corcoran Clay Faults and Rate Section (after JPL 2014)

The JPL subsidence rate evaluation indicates a subsidence rate of about 12 to 13 cm/year (6 in/year) during the 3.5-year study period. Further north and west of Hanford (not on the alignment studied for this report) along Highway 198, survey data and spot checks conducted by the RC in 2013 indicate the subsidence rates could be as high as 30.5 cm/year (12 in/year).

Relatively little subsidence has been measured north of the Kings River, and the Corcoran Clay does not extend north of the Kings River under the alignment.

A Global Positioning System control network has been established throughout the Fresno Irrigation District (FID). This network consists of more than 20 control points that are tied to the High Precision Grid Network referencing the NAVD88. It is utilized to survey existing local benchmarks to monitor subsidence (FID et al. 2006). The RC has not had access to this data to supplement the JPL study results.

### 4.5 Methane Gas Hazard

Landfills are known sources of methane gas and may pose a hazard to the CHSTP. The Fresno Sanitary Landfill is approximately 3 miles southwest of the study area. The Chestnut Avenue Landfill (12825 S Chestnut Avenue) at the intersection of Mountain View Avenue and Chestnut Avenue is essentially adjacent to the alignment. The nearest natural gas fields adjacent to the study area are 4.75 miles west of the southern terminus of CP2-3.



Section 5.0 Ground Investigation

# 5.0 Ground Investigation

## 5.1 Introduction

The RC performed the GI for the CP2-3 study area between August 19 and November 13, 2013. The investigation program included cone penetration testing, exploratory boreholes, downhole geophysical logging, and observation well installations.

The investigation was performed in general conformance with TM 2.9.1, Geotechnical Investigation Guidelines (Rev 1, July 23, 2011) and TM 2.9.2 Geotechnical Reports Preparation Guidelines (Rev 1, July 23, 2011), NTD No. 001 (April 16, 2010).

A map of exploration locations is presented in Figure 5.1-1, and higher scale exploration maps are presented in Appendices B and C.

## 5.1.1 PE4P Design

The purpose of the GI is to provide information about the subsurface soil, groundwater, and seismic conditions along the CHSTP alignment. Investigations of the subsurface conditions provide geotechnical design parameters to support the RC's design for PE4P engineering. The primary purpose of the PE4P engineering is to verify feasibility and constructability of the proposed standard, nonstandard, and complex structures within the constraints of the environmental footprint and to prepare a preliminary construction cost estimate.

### 5.1.2 Organization of Team

The geotechnical field team consisted of environmental professionals, geologists, and geotechnical engineers from the RC, and the drilling contractor was Gregg Drilling. Gregg Drilling supplied two CPT rigs and two rotary-wash, rotary drill rigs for the investigation. Laboratory testing of the retrieved soil samples was conducted by Technicon and ISI.

### 5.1.3 Field Manuals

References for field personnel included the following:

- FB GI Location Map Book (URS/HMM/Arup 2013e).
- FB Geotechnical Investigation Work Plan for Preliminary Engineering for Procurement Design Packages 2-3 and 4 (URS/HMM/Arup 2013f).
- Health and Safety Plan for use on the GI Program (URS/HMM/Arup 2013g).





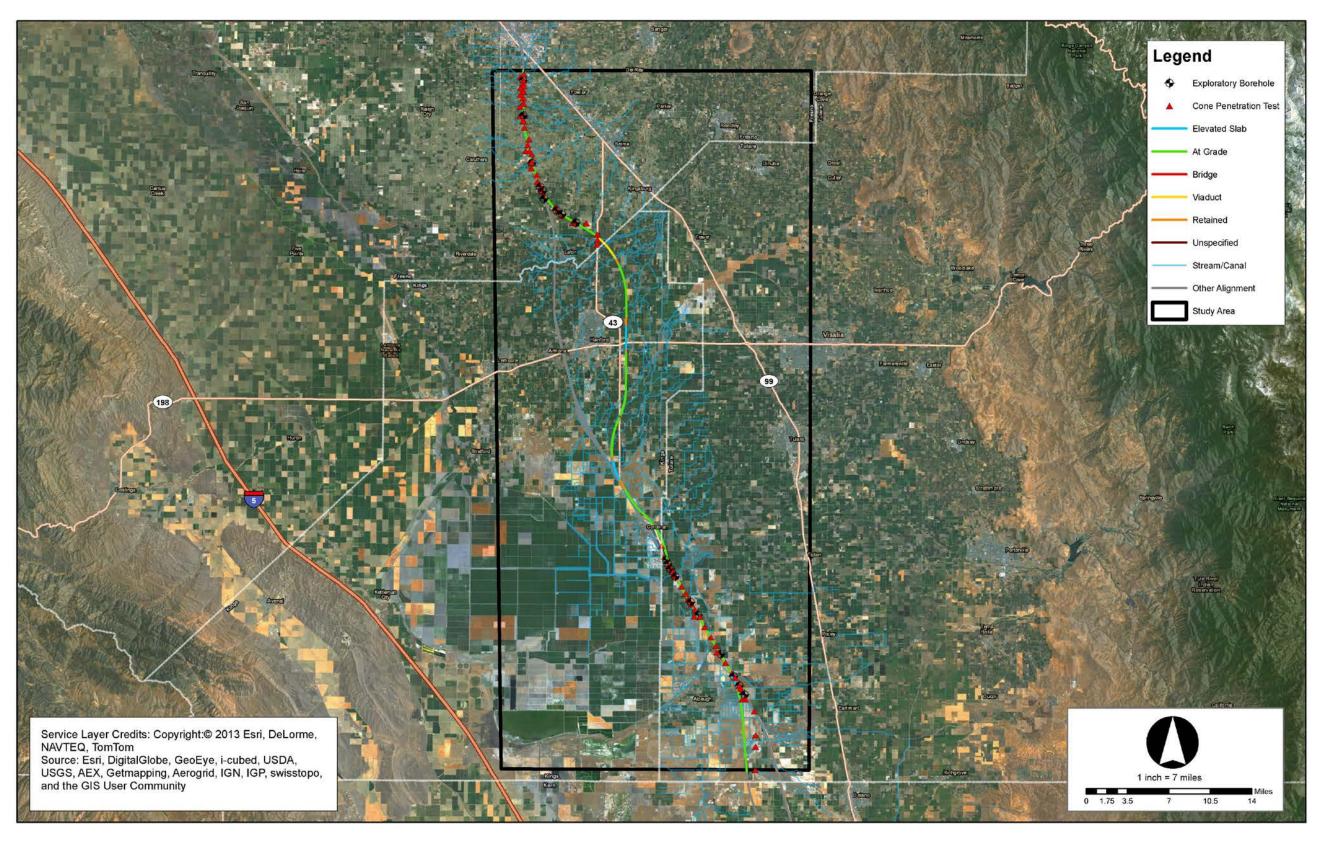


Figure 5.1-1
Map of Exploration Locations





# 5.1.4 Project Restrictions

# 5.1.4.1 Local Regulations

The RC contacted the appropriate local jurisdictions prior to site mobilization to determine permitting fees and requirements for geotechnical drilling, well construction, borehole abandonment, and street encroachment. Permits from the following agencies were obtained for all borings and CPTs completed.

- Fresno County Department of Public Health, Environmental Health Division
- Fresno County Department of Public Works
- Tulare County Resource Management Agency
- Tulare County Health Services Division
- Caltrans

When required by regulations, an experienced traffic management subcontractor was retained by Gregg Drilling to provide traffic delineation around drilling operations.

#### 5.1.4.2 Access Restrictions

The RC evaluated all proposed exploration locations prior to site mobilization to determine if any proposed locations were on private or access-restricted land. At locations where access issues were determined, holes were either relocated nearby or removed from the investigation. Some gaps exist in the numbering scheme at locations where originally planned exploratory holes were removed.

No access was permitted in Kings County. The RC pursued encroachment permits for utility clearance (Underground Service Alert) marking and biological and archaeological site clearances in advance of drilling activities. This permit was denied by Kings County. The RC also filed for permits with Kings County to conduct geotechnical exploration activities within Caltrans right-of-way within Kings County Limits. The so-called well permits were also denied. No geotechnical investigation activities were conducted within Kings County limits at the time of this report.

# 5.1.4.3 Environmental Regulations

Prior to site mobilization, representatives from both the RC and Gregg Drilling performed a joint site walkover. During this walkover, exploration locations identified within environmentally and/or culturally sensitive areas were either relocated nearby or removed from the investigation.

Following the site walkover, the RC applied for categorical exemption from the California Environmental Quality Act (CEQA) for each exploratory hole location. CEQA is California statute that requires state and local agencies to identify any significant environmental impacts of applicant's actions and to avoid or mitigate those impacts, if feasible.

CEQA Guidelines §15303(a) and §15304 categorically exempt GIs under the construction of limited new small facilities and minor alterations in the condition of land. CEQA Guideline §15276(a) categorically exempts regional transportation projects. GIs are exempt from CEQA under Guidelines §15306 and §15061(b) (3), provided they do not have a significant effect on the environment. In keeping with Authority prudence, the RC submitted exemptions prior to initiating the GI.

All applications for categorical exemption were granted for this investigation.



# 5.2 Cone Penetration Testing Program

CPTs are continuous in situ tests that record geotechnical data through a piezocone that is pushed vertically into the ground at a constant rate of about 20 millimeters per second. The piezocone consists of a conical pointed penetrometer that measures penetration resistance and a cylindrical sleeve that measures frictional resistance. Geotechnical parameters are measured and recorded electronically.

Gregg Drilling completed a total of 74 CPTs between August 19 and November 13, 2013. CPTs were performed following ASTM International (ASTM) test method D 5778. CPTs were completed to depths between 45.1 and 150.4 feet, depending on the alignment profile and whether refusal was met. A summary of CPT coordinates, elevations, depths, and additional in situ testing, including seismic CPTs (SCPTs) and pore pressure dissipation tests (PPDTs), is presented in Table 5.2-1. A map of test locations, and the tabulated location information are shown in Appendix C. CPT locations were spaced at an average of about 1/3 mile apart to develop subsurface soil properties for PE4P.

CPTs have a distinct advantage over boreholes because they provide a continuous profile of tip resistance, friction, and pore pressures generated during penetration while generating minimal investigation waste. The results are most useful in distinguishing changes in stratigraphy, particularly where there may be numerous soil layers with rapid changes with depth. Soft zones embedded within sandy or harder soils can be identified with reasonably good accuracy. Such lenses could be easily missed with conventional boreholes.

CPTs can be used to evaluate soil parameters such as the undrained strength and the strain modulus. Widely used procedures have been developed for using the cone data directly in estimating settlements of footings on sand, load capacities of piles, shear wave velocities, and liquefaction potential. In addition to standard CPT results, specific in situ testing was performed, including the following:

- PPDT to describe the hydrostatic water pressure and permeability of discrete strata.
- SCPT to define in situ shear wave velocities.

### 5.2.1 Conventional Cone Penetration Tests

Conventional CPTs were performed to measure penetration resistance, friction resistance, and pore pressure nearly continuously by pushing a piezocone at a constant rate.

## 5.2.1.1 Equipment

Two truck-mounted CPT rigs with 30-ton thrust capacity and hydraulic loading systems were onsite for the duration of the CPT investigations. The rigs pushed CPT cones 1 3/4 inches in diameter with a projected base area of 2 1/3 square inches. The cone sleeve friction area was 35 square inches. Push rods were 1 3/4 inches in diameter, and the grouting rods were 2 inches. The push rods and grouting rods were both 3.3 feet in length.

Each CPT cone was equipped with a porous plastic filter behind the cone tip that measured pore pressure as the piezocone was advanced and enabled dissipation testing as described in Section 5.2.3.4.

#### 5.2.1.2 Procedures

Gregg Drilling performed CPT soundings in accordance with ASTM D 5778 procedures. At each test location, they hand-augered holes to a depth of approximately 5 feet to protect unidentified



or unknown utilities. Where an obstruction was encountered during hand-augering, the hole was backfilled and a new hole was hand-augered near the original hole.

Once cleared for utilities, the hole was backfilled with sand and the CPT rig was positioned over the hole. The piezocone was pushed using the weight of the CPT rig. Results from the upper 5 feet of disturbed soil were not included in the results but have been indicated with gray shading on the CPT logs.

At some CPT locations, cemented layers were encountered below a depth of 5 feet. At these locations to avoid damaging the instrument, holes were either (1) pre-drilled using a solid flight augering or (2) "pre-punched" using an oversized steel dummy probe to advance beyond the cemented zone. The CPT locations and depths that required additional pre-drilling and/or pre-punching are noted in Appendix C.

The piezocone was pushed at a constant rate of about 1 inch per second with rod breaks at 3.3-foot intervals. An electronic data acquisition system was used to record measurements of cone tip resistance, sleeve friction, inclination, and pore pressure at about 1- to 2-inch intervals.

CPT soundings were performed to the depths proposed in the *FB Geotechnical Investigation Work Plan for Preliminary Engineering for Procurement Design Packages 2-3 and 4* (URS/HMM/Arup 2013b) or until one of the following criteria was met:

- The hydraulic capacity of the rig was reached.
- The maximum load range for the sensors was reached.
- The inclination of the push rods exceeded 15 degrees.

When one of these criteria was reached at a depth shallower than planned, the test hole was deemed to have encountered refusal and was terminated. CPT holes were pre-drilled if refusal was encountered shallower than 35 feet below grade.

#### 5.2.1.3 Locations

A summary of CPT coordinates, elevations, depths, and additional in situ testing is presented in Appendix C. A total of 74 CPTs were performed during the investigation. A map of the testing locations is also provided in Appendix C.

#### 5.2.1.4 Results

The CPT results provided in Appendix C include plots of tip resistance, friction ratio, pore pressure, and estimated soil behavior type versus depth.

The reported pore pressure values from the CPT logs are not necessarily indicative of the known groundwater conditions, based upon the recorded levels from standpipe piezometers. At some locations, intermittent perched groundwater layers may generate localized pore pressures.

## 5.2.2 Seismic Cone Penetration Tests

A total of six SCPTs were conducted in accordance with ASTM D 7400 at the selected CPT locations shown in Appendix C. SCPTs measure shear wave velocities in addition to the standard piezocone parameters. A map showing SCPT locations is also provided in Appendix C.



# 5.2.2.1 Equipment

SCPTs use the same general equipment as described for the conventional CPTs, including the electronic data acquisition system. The primary difference is that the SCPT is fitted with a seismometer to record the arrival of shear waves generated by a surface impact source.

The surface wave was generated by striking a seismic beam fastened to the ground with a sledgehammer. Before SCPT measurements are recorded, the rods are decoupled from the CPT rig to prevent energy transmission down the rods.

A schematic of the primary elements of the apparatus including the data acquisition system is shown on Figure 5.2-1.

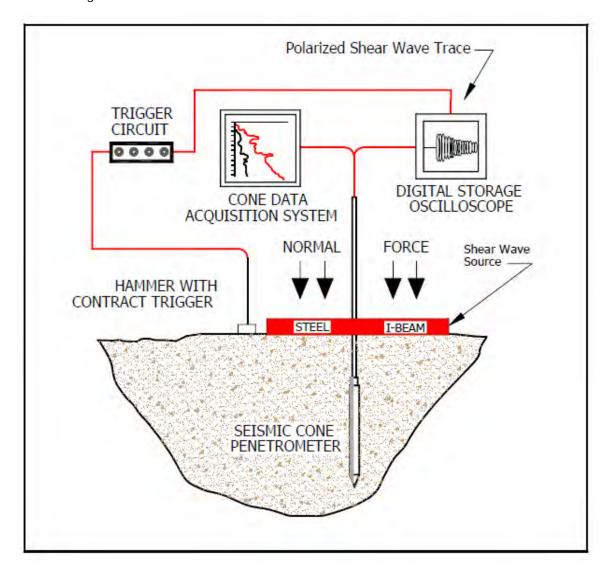


Figure 5.2-1
SCPT Schematic (Gregg Drilling 2011)



### 5.2.2.2 Procedures

At SCPT locations, a beam was fastened to the ground adjacent to the CPT collar. At each testing depth, the seismic beam column was struck twice on each side of the beam with a sledgehammer. The striking of the column triggers a record of shear wave velocity in the piezocone at depth. SCPTs were performed at 1-meter intervals.

The electronic data acquisition system recorded this measurement, and the operator checked for quality. When necessary, additional hammer strikes were performed at a single depth interval to ensure useable data were retrieved.

### 5.2.2.3 Locations

The testing locations are shown in Appendix C and tabulated in Table C-1.

#### 5.2.2.4 Results

Table 5.2-1 shows the results of shear wave velocities averaged over the upper 100 feet ( $\sim$ 30 meters) of soil,  $V_{s30}$ , from SCPTs. SCPTs that met refusal shallower than 100 feet have been averaged over the depth tested. A graphical profile of measured shear wave velocities is presented in Figure 5.2-2.

**Table 5.2-1**Average Shear Wave Velocities from SCPTs

Borehole ID	V <sub>s30</sub> (ft/s)	Site Class <sup>[1]</sup>	
S0053CPT <sup>[2]</sup>	908	D	
S0088CPT	1,045	D	
S0102CPT	996	D	
S0194CPT	958	D	
S0216CPT	840	D	
S0226CPT	858	D	

<sup>[1]</sup> As defined in 2006 IBC Section 1613.5.5 (ICC 2006).

Based upon the calculated average shear wave velocities obtained from SCPT, the ground profile is classified as Site Class D by NEHRP definitions (ICC 2006) presented above. Site Class D defines ground profiles with  $V_{s30}$  ranging from 600 to 1,200 feet per second as "stiff soil" for design purposes.



<sup>&</sup>lt;sup>[2]</sup>Seismic data collected on S0053CPT was of poor quality. Hits near the surface were too noisy to determine arrival times. Since wave forms were low-quality, data should be viewed with a larger than average error margin.

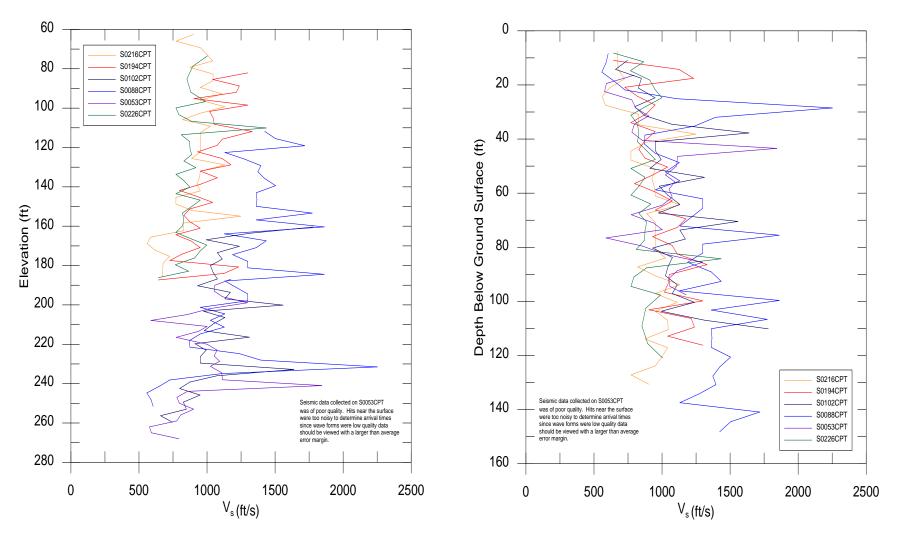


Figure 5.2-2
Shear Wave Velocity Profiles from SCPTs



### 5.2.3 Pore Pressure Dissipation Testing

PPDTs were performed at all CPT locations during a pause in cone penetration to measure the rate of dissipation of excess pore water pressure generated by the CPT push. The variation of the pore pressure with time was measured via a porous filter behind the cone tip.

PPDT data can be interpreted to provide estimates of hydrostatic pore water pressure and coefficients of consolidation and permeability at a soil layer of interest. Dissipation tests may be performed rapidly in sands but may take several hours in high-plasticity clays. The rate of dissipation depends primarily upon soil compressibility and permeability characteristics. However, cone diameter will also influence results as dissipation rate increases with increasing cone diameter.

In order to correctly interpret the equilibrium piezometric pressure, the pore pressure must be monitored until all of the excess pore pressure has dissipated.

# 5.2.3.1 Equipment

PPDTs used the same equipment described in Section 5.2.3, including an electronic data acquisition system. Piezocones were equipped with a porous plastic filter behind the cone tip that measured dynamic pore pressure as the piezocone was advanced.

#### 5.2.3.2 Procedures

PPDTs were performed at locations where excess pore pressures were generated during cone penetration, at depths selected by the RC field representative. PPDTs were performed in accordance with ASTM D 5778.

At selected depths, CPT operations were paused to complete the PPDT. Pore pressure was monitored during testing for a maximum of 42 minutes where required to attempt to allow excess pore pressures to dissipate. Test durations are summarized in Table 5.2-2.

### 5.2.3.3 Locations

This data report presents the results of 63 PPDTs. Additional tests were performed; however, the results would not provide any meaningful interpretation of the groundwater conditions as discussed below. The testing locations are shown in Table 5.2-2.

### 5.2.3.4 Results

A summary of PPDT results is presented in Table 5.2-2. Graphs showing pore pressure over time for each PPDT are included in Appendix C.

The results of the PPDTs are not necessarily indicative of the known groundwater conditions. Many of the PPDTs were performed at depths shallower than the known depth to groundwater, based upon the recorded levels from standpipe piezometers installed as part of this study. Moreover, many of the test results were not readily conducive to estimating the in situ permeability because either equilibrium pore pressures were not achieved or the pore pressures converged to negative values.

Table 5.2-2 includes the PPDT test results and the estimated normalized CPT soil behavior type (SBT<sub>N</sub>) (Robertson 2010) at the elevation of each PPDT for comparative purposes.  $SBT_N$  descriptions are provided in Appendix C.



**Table 5.2-2**Summary of Pore Pressure Dissipation Test Results

		Final		Field Me	asurements	Normalized	
CPT ID	Test Depth (ft)	Final Pore Pressure (ft H <sub>2</sub> 0)	Test Duration (sec)	Depth to Water (ft)	Depth to Partial Sloughing <sup>[1]</sup> (ft)	Soil Behavior Type at PPDT Depth (SBT <sub>N</sub> ) <sup>[2]</sup>	
S0044CPT	85.8	33.9	1,875	-	67.0	6	
S0045ACPT	-	-	-	-	-	-	
S0045CPT	_	-	-	-	-	-	
S0046CPT	76.0	12.3	1,790	-	-	5	
S0047CPT	94.2	45.0	2,100	-	-	6	
S0048CPT	91.0	43.0	1,805	66.4	66.9	5	
S0049CPT	90.1	28.0	2,130	70.9	-	6	
S0050CPT	81.0	26.3	1,860	69.0	-	6	
S0051CPT	85.3	20.3	1,230	_	-	5	
S0052CPT	83.3	39.0	1,830	-	-	5	
COOF 2 CDT	75.6	5.4	1,785		72.0	5	
S0053CPT	100.6	26.2	185	_	73.0	4	
S0054CPT	73.5	2.4	1,990	_	_	6	
S0055CPT	74.0	3.0	970	70.2	70.2	5	
S0056CPT	100.6	37.0	1,965	77.6	_	4	
S0059CPT	-	-	-	_	80.8	-	
S0060CPT	89.7	4.0	645	_	84.0	5	
S0062CPT	100.2	6.8	1,645	_	86.5	6	
S0063CPT	94.8	3.3	1,140	_	87.0	5	
S0065CPT	82.5	6.0	1,210	_	89.0	5	
S0068CPT	100.1	6.0	1,825	-	81.7	6	
S0071CPT	71.2	8.7	1,075	86.6	88.0	6	
S0074CPT		-	-	dry	-	-	
S0075CPT	106.6	9.1	1,560	-	81.5	5	



**Table 5.2-2**Summary of Pore Pressure Dissipation Test Results

		Final		Field Me	Normalized	
CPT ID	Test Depth (ft)	Final Pore Pressure (ft H <sub>2</sub> 0)	Test Duration (sec)	Depth to Water (ft)	Depth to Partial Sloughing <sup>[1]</sup> (ft)	Soil Behavior Type at PPDT Depth (SBT <sub>N</sub> ) <sup>[2]</sup>
S0076CPT	-	-	-	dry	-	-
S0078CPT	-	-	-	-	101.0	-
S0079CPT	108.6	5.8	855	-	85.5	5
S0080CPT	-	-	-	dry	-	-
S0082CPT	-	-	-	dry	open to depth	-
S0084CPT	-	_	_	dry	open to depth	-
S0086CPT	110.4	8.4	1,895	-	65.9	5
S0087CPT	107.6	2.8	1,920	-	_	4
S0088CPT	141.2	31.4	1,865	106.0	_	5
S0089CPT	121.9	12.7	1,720	_	-	5
S0090CPT	105.3	4.2	2,350	dry	open to depth	6
S0094ACPT	106.1	48.4	1,045	_		8
S0096ACPT	-	_	_	dry	open to depth	-
S0098BCPT	80.7	6.0	1,005	_	61.0	5
S0098CPT	97.1	7.3	2,095	_	34.0	6
S0099CPT	89.1	7.7	1,235	dry	83.0	6
S0100CPT	100.9	35.6	1,275	65.0	-	5
S0102CPT	114.7	38.6	1,115	64.5	64.5	5
S0105BCPT	144.4	87.9	2,490	54.0	-	5
S0186CPT	94.5	41.6	1,960	-	-	6
S0188CPT	84.8	48.4	1,075	-	-	6
S0190CPT	104.3	59.2	600	-	-	6
S0191CPT	48.6	22.2	645	-	-	6
S0192CPT	117.8	78.4	385	30.0	-	5



**Table 5.2-2**Summary of Pore Pressure Dissipation Test Results

		Final		Field Measurements		Normalized	
CPT ID	Test Depth (ft)	Pore Pressure (ft H <sub>2</sub> 0)	Test Duration (sec)	Depth to Water (ft)  Depth to Partial Sloughing <sup>[1]</sup> (ft)		Soil Behavior Type at PPDT Depth (SBT <sub>N</sub> ) <sup>[2]</sup>	
S0193CPT	95.6	55.5	410	-	-	5	
S0194CPT	-	-	-	dry	-	-	
S0195CPT	60.2	14.2	665	32.6	-	6	
S0198CPT	37.2	6.9	635	43.3	43.3	5	
S0199CPT	47.4	4.2	1,440	40.3	-	6	
S0200CPT	39.5	5.8	920	_	-	6	
S0201CPT	63.5	23.3	605	-	26.0	6	
S0202CPT	-	-	-	-	-	-	
S0203CPT	58.4	39.4	1,100	38.0	-	6	
S0204CPT	-	-	-	41.1	-	-	
S0206CPT	85.1	53.0	605	-	-	6	
S0208CPT	103.2	79.3	330	-	-	4	
S0210CPT	111.1	71.6	385	10.0	13.0	5	
S0211CPT	123.2	68.7	955	-	-	5	
C0212CDT	40.8	39.0	1,085			6	
S0212CPT	144.5	49.3	285	_	_	5	
S0214CPT	61.5	47.6	725	12.8	13.8	5	
S0216CPT	39.4	24.6	1,060	-	-	6	
S0218CPT	100.2	53.9	475	_	_	5	
S0220CPT	51.5	42.5	960	-	19.4		
S0221CPT	115.8	63.4	400	-	-	4	
S0222CPT	92.5	63.5	515	-	-	5	
S0225CPT	40.2	32.8	555	-	-	6	
S0226CPT	47.9	43.4	620	_	-	6	



**Field Measurements** Normalized **Final** Test Test Soil Behavior Depth to Pore Depth to **CPT ID** Type at PPDT Depth **Duration** Partial **Pressure** Water Depth (ft) (sec) Sloughing<sup>[1]</sup> (ft  $H_20$ ) (ft)  $(SBT_N)^{[2]}$ (ft) 590 4 86.1 65.3 S0230CPT 102.9 77.6 340 10.0 6 S0237CPT S0239CPT 67.9 4 45.6 1,730 S0241CPT 41.0 14.7 1,645 6

**Table 5.2-2**Summary of Pore Pressure Dissipation Test Results

# 5.2.4 Cone Penetration Test Completion and Abandonment

All CPTs were backfilled by tremie methods with cement grout in accordance with local permitting agency regulations.

During abandonment, a sacrificial (dummy) tip and hollow rod were pushed back into the original sounding hole to the maximum depth explored. The hollow rod was pulled back to leave the sacrificial tip at the bottom of the hole, and then the hole was backfilled with neat cement grout using the hollow rod as a tremie tube.

A county inspector periodically observed the backfilling of CPTs.

# 5.3 Exploratory Borehole Program

# 5.3.1 Overview

A total of 19 exploratory boreholes were completed by Gregg Drilling from August 19 to November 13, 2013. These boreholes are as shown in Appendix B. A summary of the all borehole locations is presented in Table B-1. Borehole locations were spaced at an average of about 1 mile apart. Boreholes were drilled to a depth of 81.5 to 165 feet, depending on the type of proposed railway or roadway structure at the location.

# 5.3.2 Drill Rig and Hammer Types

Drilling was performed primarily using rotary-wash methods with truck-mounted rigs and drilling mud (consisting of bentonite) as the circulating fluid. Hand-augering was performed to a depth of approximately 5 feet at borehole locations to address utility concerns.

Samplers were driven with an automatic trip hammer that was calibrated on-site in a selected borehole drilled by each rig.



<sup>&</sup>lt;sup>[1]</sup>Hole dry at this depth unless depth to water recorded. Holes occasionally sloughed or partially collapsed prior to pushing grouting rods to total depth and backfilling with grout.

<sup>[2]</sup> After Robertson 2010.

## 5.3.3 Sampling Methods and Equipment

In accordance with TM 2.9.1 (dated June 2011), the drilling team collected driven soil samples using a 2-inch-outer-diameter SPT sampler. The SPT sampler satisfies the requirements of ASTM D 1586. An interior liner was not used. Samples were also collected using a 3-inch-outer-diameter "California modified" sampler with brass or stainless steel liners. The liners used were typically 2.43 inches in inside diameter and 6 inches tall, but occasionally 1-inch tall sample rings were used to obtain samples for specific laboratory testing such as direct shear or collapse tests.

In general, samples were obtained at 5-foot intervals to the bottom of each borehole. In selected boreholes, continuous sampling or undisturbed sampling using Shelby or Pitcher barrel samplers was performed to target particular depths of interest.

A bulk sample was collected from the upper 5 feet in selected boreholes for compaction testing.

#### 5.3.4 Handheld Field Tests

Soils appropriate for handheld field tests were rarely encountered during this phase of the investigation. When encountered, index strength tests were performed using a torvane and/or hand penetrometer device. Results of handheld field tests are indicated on the borehole logs presented in Appendix B.

#### 5.3.5 Groundwater-Level Measurements

Groundwater-level measurements were generally not performed during drilling due to the use of drilling mud.

To monitor groundwater levels, standpipe piezometer observation wells were installed in selected boreholes. Information on the locations, depths, and construction details of standpipe piezometer installations is presented in Appendix B.

# 5.3.6 Sample Handling

Samples were preserved and transported in accordance with ASTM D 4220 guidelines. SPT samples were collected and retained in resealable plastic bags, California modified samples were collected in 2-inch-inside-diameter by 6-inch-tall brass tubes with plastic caps and sealed with duct and electrical tape, and Shelby tube samples were collected in 2-7/8-inch-inside-diameter by either 24-inch- or 30-inch-tall aluminum tubes with expansion packers and plastic caps sealed with duct and electrical tape. Soil samples were transported periodically to a local storage facility, located at 3636 N Hazel Avenue in Fresno. At this storage facility, samples were reviewed and assigned for laboratory testing. Samples not tested will remain at the storage facility until June 30, 2014.

# 5.3.7 Borehole Completion and Abandonment

All boreholes that were not selected to be converted to piezometers were backfilled with cement grout in accordance with local permitting agency regulations. The field engineering team interacted with Fresno County Environmental Health Department and Tulare County Environmental Health Division representatives, who periodically inspected the backfilling of boreholes.

Drill cuttings and fluids were initially collected in drums and kept adjacent to the borehole locations until each borehole was completed. Upon completion of each borehole, the drums were transported to the storage facility and consolidated in a single waste container so that the drums



could be reused. At the completion of drilling operations, the waste container was characterized for contaminants and then disposed of at an appropriate licensed landfill site.

# 5.3.8 Borehole Log Organization and Presentation

Upon withdrawal from the borehole, the samplers were cleaned, the sample material classified visually, and the information entered into the field borehole log. The samples were classified using ASTM D 2488 standards supplemented with the Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010). Soil classification procedures are included in Appendix B.

#### 5.3.9 Standard Penetration Tests

Sampling was performed in general accordance with ASTM D 1586. SPT and 2½-inch-outside-diameter "California modified" samples were driven using a 140-pound automatic trip hammer falling from a height of 30 inches. California modified samples were driven with brass liners. Blow counts for the SPT samplers were recorded for each 6-inch interval for an 18-inch drive. The criterion for sampler refusal was considered to be blow counts exceeding 50 for any 6-inch interval.

The combined blow count from the second and third 6-inch intervals is the Standard Penetration Resistance (N-value) and is shown on the borehole logs in Appendix B. It should be noted that the reported N-value has not been corrected for hammer energy, overburden, sampler size, or field procedures.

# 5.3.10 Borehole Log Database

Data from the field borehole logs were entered and stored in the geotechnical database program gINT v8. Borehole logs created with gINT are included in Appendix B of this report.

#### 5.3.11 Standard Penetration Test Hammer Energy Calibration

SPT hammer energy calibration testing was performed by Gregg Drilling on the two rotary-wash drill rigs used for the investigation. The purpose of testing was to measure the energy transferred from the hammer to the drill rod and to calculate the energy efficiency of the hammer. The principle of conducting the test is to standardize the energy per blow count so that a baseline measurement is established amongst the various hammers used to collect geotechnical samples. The hammer energy baseline can be used to standardize data that can be compared and analyzed.

The tests were performed on August 22, 2013, for drill rig I.D. D-44 and on September 18, 2013 for D-1. The energy calibration tests were conducted for boreholes S0021R and S0089R, respectively.

A Gregg Drilling and Testing field engineer collected measurements and data using a Model PAK Pile Driving Analyzer. Two strain gauges mounted on a 2-foot section of the drill rods measured force, while two piezoresistive accelerometers bolted on the same rod measured acceleration. The gauges were mounted approximately 6 inches from the top of the rod. Hammer energy tests were performed in accordance with ASTM D 4633.

The complete reports for each SPT energy calibration are provided as an attachment in Appendix B. The output for each recorded impact of the hammer included the following:

- Blow count in blows per foot.
- Maximum rod force.



- Maximum rod velocity.
- Maximum transferred energy.
- Blows per minute.
- Energy transferred in percent of maximum.

Results from these calibrations indicate an average measured energy transfer of 85 and 78 percent, respectively, for the SPT hammers D-44 and D-1 used in boreholes S0021R and S0089R.

Hammer efficiencies, data and information have been included on each borehole log presented in Appendix B.

# 5.4 Downhole Geophysical Logging

Site-specific velocity profiles are required to establish site classifications, estimate seismic ground motions, and perform site response analyses for PE4P design, as detailed in TM 2.9.6.

Downhole shear wave velocity measurements were completed in selected boreholes using the PS logging method. Logging was performed by GEOVision Geophysical Services, of Corona, California. The summary report prepared by GEOVision is included in Appendix D.

PS logging provides high-resolution measurements (typically spaced at intervals of about 1.5 feet) for the determination of in situ shear and compression wave velocities in deep, uncased boreholes.

The test data provide detailed information regarding the variation of velocities with depth and can accurately differentiate interfaces between layers. The profiles are particularly useful in detecting relatively thin layers of either softer or harder materials that may be interbedded and would be difficult to detect from boreholes alone.

# 5.4.1 Field Procedures

Downhole seismic surveys were performed in accordance with ASTM D 5753 and D 7400 procedures using method suspension system, manufactured by OYO Corporation. The OYO system uses a 7-meter probe, containing a source and two receivers spaced 1 meter apart, suspended by a cable. The armored 4- or 7-conductor cable serves both to support the probe and to convey data to and from a recording/control device on the surface. The probe is lowered into the borehole to a specified depth, where the source generates a pressure wave in the borehole fluid. The pressure wave is converted to seismic waves (P and S) at the borehole wall. Along the wall at each receiver location, the P and S waves are converted back to pressure waves in the fluid and received by the geophones, which send the data to the recorder on the surface (GeoVision 2012).

Boreholes selected for PS logging were over-drilled 15 feet beyond their sampled depths and flushed with clean water. Measurements were performed in an open hole, below the level of surface casing.

#### 5.4.2 Frequency of Testing

Downhole geophysical logging was performed in three boreholes: S0028R, S0067R, and S0072R. A map showing these PS logging locations is provided in Appendix D.

Depths of these boreholes range from 101.5 to 165 feet. Measurements were recorded in 1.6-foot (about 0.5-meter) Intervals. Table 5.4-1 summarizes PS logging test locations and depths.



**Table 5.4-1**Summary of PS Logging

Davahala	Dete	Northing,	Easting,	Sting, Elevation, Depth Interval		
Borehole ID	Date Logged	NAD83 (FT)	NAD83 (ft)	NAVD88 (ft)	Top Depth (ft)	Bottom Depth (ft)
S0028R	9/4/2013	2,072,585	6,348,973	261.2	9.84	152.56
S0067R	9/9/2013	1,902,052	6,407,179	194.1	3.28	152.56
S0072R	10/7/2013	1,849,931	6,437,979	196.0	4.92	152.56
[1]Logging performed at 1.6-foot intervals between top and bottom depths						

#### 5.4.3 Results

Shear wave velocities averaged over the upper 100 feet ( $\sim$ 30 meters) of soil,  $V_{s30}$ , are presented in Table 5.4-2. A graphical profile of measured shear wave velocities is presented in Figure 5.4-1.

**Table 5.4-2**Average Shear Wave Velocities from PS Logging

Borehole ID	V <sub>s30</sub> (ft/s)	Site Class <sup>[1]</sup>			
S0028R	978	D			
S0067R	950	D			
S0072R	816	D			
<sup>[1]</sup> As defined in 2006 IBC Section 1613.5.5 (ICC 2006)					

Shear wave velocities were calculated in accordance with the procedures described in the test summary report prepared by GEOVision, provided in Appendix D. This report describes further details of the PS logging method, including test equipment, measurement procedures, and data analysis.

Based upon the calculated average shear wave velocities obtained from PS logging, the ground profile classifies as Site D by NEHRP definitions (ICC 2006) in Table 3.3-1.

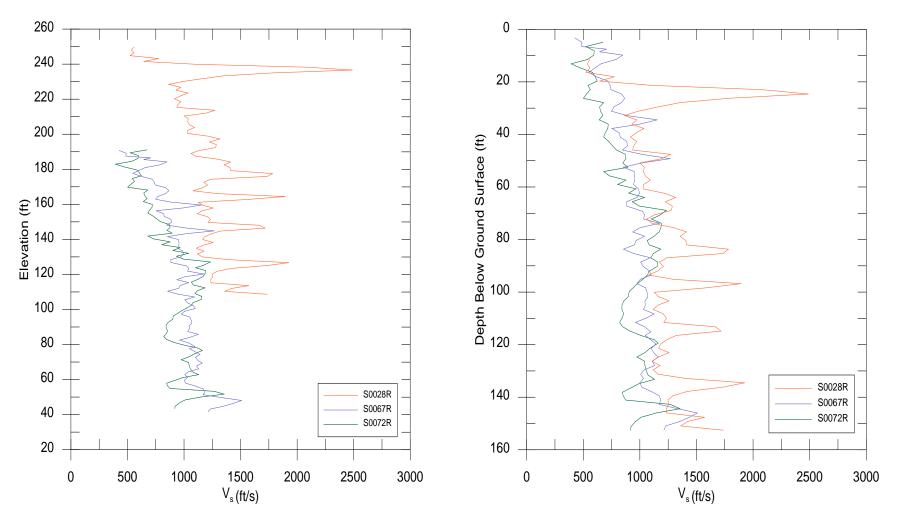


Figure 5.4-1
Shear Wave Velocity Profiles from PS Logging



#### 5.5 Observation Wells

Three standpipe piezometer observation wells were installed during the GI. During piezometer installation, the depths of the piezometer end cap, sand filter, bentonite seal, and grout, and the length of the slotted screen were recorded. Piezometer installation records are included in the borehole logs in Appendix B and summarized in Table 5.5-1.

**Table 5.5-1**Standpipe Piezometer Installation Details

D'	Northing,	Easting,	Top of Casing	Well Screen Depth		Sand Filter		
Piezometer ID	Date Installed	NAD83 (ft)	NAD83 (ft)	Elevation, NAVD88 (ft)	Top Depth (ft)	Bottom Depth (ft)	Top Depth (ft)	Bottom Depth (ft)
S0020R	8/21/2013	2,104,379	6,341,583	278.2	80	100	74	102
S0029R	8/28/2013	2,070,526	6,350,083	260.1	85	105	83	105
S0068R	10/23/2013	1,898,743	6,409,398	198.2	21	51	19	49
S0071R	10/11/2013	1,854,182	6,435,478	192.2	36	56	31	67
S0072R	10/7/2013	1,849,931	6,437,979	196.0	115	135	110	137

<sup>&</sup>lt;sup>[1]</sup> 2-inch-outer-diameter Schedule 40 PVC with 0.020-inch slotted screen

# 5.5.1 Field Procedures

Standpipe piezometers were installed using the following standard procedures. A schematic standpipe piezometer installation is shown in Figure 5.5-1.

- Borehole filled with No. 3 filter sand to desired depth of piezometer end cap.
- 2-inch-outer-diameter Schedule 40 PVC solid flush-joint casing with 20-foot length of 0.020-inch slotted screen installed to depth of, at minimum, 2 feet above bentonite chip grout.
- No. 3 filter sand tremied into borehole to cover, at minimum, 2 feet above and below screened section of PVC casing.
- Bentonite pellet seal placed with, at minimum, 1 feet coverage over No. 3 filter sand pack.
- Remaining section of borehole backfilled with cement grout.
- Well box installed flush with ground surface.

Logs of each piezometer installation are included with the respective boring log in Appendix B.



<sup>[2]</sup> No. 3 Monterey sand

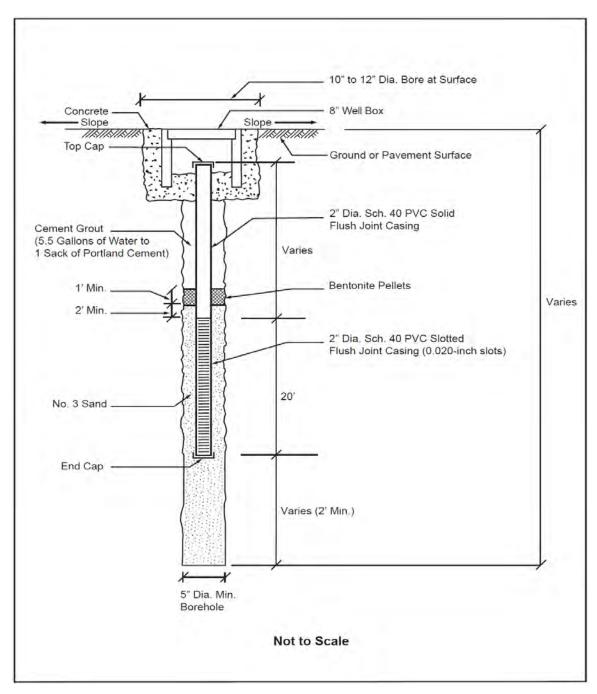


Figure 5.5-1
Schematic Standpipe Piezometer Installation

Upon completion of piezometer installations, piezometers were developed in accordance with ASTM D 5521 standards. Piezometer development included bailing and mechanical surging to remove fine-grained materials and drilling fluids from the slotted screen, filter sand pack, and adjacent formation.

Gregg Drilling maintained records of the various operations performed during development, including the type of equipment used, approximate volume of water removed from the piezometers, and static water level before and after development. When possible, at least five well volumes of water were removed from each piezometer.

#### 5.5.2 Frequency of Testing

Piezometers are monitored on an hourly basis with a data logger. The data are downloaded periodically. This monitoring is to help in understanding long-term groundwater behavior.

#### 5.5.2.1 Results

Results from the groundwater monitoring program are presented in Table 5.5-2 and Figure 5.5-2. The well box elevation is relative to NAVD88. The initial measurements shown in Figure 5.5-2 were taken immediately after well development and bailing, and likely did not have time to stabilize. The stabilized readings of the dataloggers are confirmed by the manual measurements taken in January 2014.

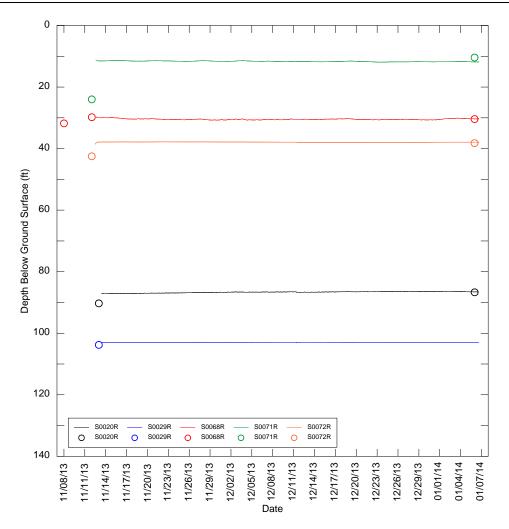
**Table 5.5-2**Groundwater Levels Measured in Standpipe Piezometers

Piezometer ID	S0020R	S0029R	S0068R	S0071R	S0072R	
Well Box Elevation	278.2	260.1	198.2	192.2	196.0	
Date Read	Measured Depth Groundwater <sup>[1]</sup> (ft)					
10/29/2013	88.4 <sup>[2]</sup>					
11/8/2013			31.8 <sup>[2]</sup>			
11/12/2013			29.8	24.0	42.5	
11/13/2013	90.3	103.8				
1/6/2014	86.7	-	30.4	10.4	38.2	

<sup>[1]</sup> Measured with water meter



<sup>[2]</sup> Measured prior to well development



**Figure 5.5-2**Groundwater Depths Measured in Standpipe Piezometers

Section 6.0 Laboratory Investigations

# 6.0 Laboratory Investigations

A laboratory test program was completed to provide the necessary data to evaluate the physical and engineering characteristics of soils and groundwater encountered during the ground investigation.

Laboratory testing was performed by Inspection Services Inc. of Berkeley, California, and Technicon Consultants, of Fresno, California. Soil testing was performed in general accordance with the following ASTM standard test methods:

- ASTM D 422, "Standard Test Method for Particle-Size Analysis of Soils."
- ASTM D 1140, "Test Method for Amount of Material in Soils Finer than the No. 200 Sieve."
- ASTM D 1557, "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3))."
- ASTM D 1883, "Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils."
- ASTM D 2844, "Standard Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils."
- ASTM D 4829, "Standard Test Method for Expansion Index of Soils."
- ASTM D 2216, "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock."
- ASTM D 2974, "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils."
- ASTM D 3080, "Standard Test Method for Direct Shear Test of Soils Under Consolidated Drained Conditions."
- ASTM D 4318, "Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils."
- ASTM D 4327, "Standard Test Method for Anions in Water by Chemically Suppressed Ion Chromatography."
- ASTM G 57, "Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method."

Additionally, groundwater chemistry testing was performed in accordance with the following US Environmental Protection Agency (EPA) and Standard Methods for the Examination of Water and Wastewater (SM) procedures:

- EPA 200.7, "Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Spectrometry."
- EPA 300.0, "Inorganic Anions by Ion Chromatography. Official Name: Determination of Inorganic Anions by Ion Chromatography."
- SM 2320B, "Alkalinity."
- SM 2510B, "Conductivity."
- SM 4500-H<sup>+</sup>B, "pH Value."



Laboratory test results are presented in the following sections. The complete test summary reports by Inspection Services, Inc. and Technicon Consultants are included in Appendix E.

# 6.1 Index Property Testing

Index property testing was performed to provide soil classifications and determine general engineering behavior. The information gathered from index tests may be used to assess the variability of soils and help refine the soil stratigraphy profile along the alignment.

Geotechnical index testing for the soil samples included moisture content, No. 200 sieve wash, hydrometer, grain-size analysis, Atterberg limit, and organic content tests. Table 6.1-1 presents the range of results obtained for each index test performed. Additionally, a specific gravity test was conducted at boring S0071R as part of consolidation testing.

**Table 6.1-1**Summary of Results from Index Property Tests

Test	Test Reference	No. of Tests	Range of Values <sup>[1]</sup>	Mean Value <sup>[2]</sup>	Standard Deviation <sup>[2]</sup>
Moisture Content	ASTM D 2216	227	0.3 to 35.3%	18%	7%
Fines Content	ASTM D 1140	168	2.9 to 99%	41%	28%
Liquid Limit	ASTM D 4318	77	NP to 71%	38%	13%
Plastic Limit	ASTM D 4318	77	NP to 47.2%	20%	6%
Plasticity Index	ASTM D 4318	77	NP to 55	18	14
Organic Content	ASTM D 2974	1	4.65%	4.65%	_

<sup>[1]</sup> NP = non-plastic

# 6.2 Direct Shear Testing

Direct shear tests were performed in accordance with ASTM D 3080 procedures in order to obtain effective-stress soil parameters from remolded specimens.

Direct shear test results are presented in Table 6.2-1.

**Table 6.2-1**Summary of Results from Direct Shear Tests

Test	No. of Tests	Range of Values	Mean Value	Standard Deviation
Effective Cohesion	49	0 to 4,580 psf	742 psf	976 psf
Effective Friction Angle	49	10° to 51°	33°	6°



<sup>[2]</sup> NP values excluded

# 6.3 Compaction Testing

Compaction testing was performed on bulk samples obtained in the upper 5 to 10 feet of material to evaluate the compaction characteristics of soils that may be used as fills for embankments, retaining walls, and structural foundations. Increased compaction level generally leads to greater strength and stiffness, and lower settlement under anticipated loading conditions.

Compaction testing was performed using the modified Proctor test method. The modified Proctor test is used to determine the maximum bulk density to which a soil can be compacted given specified compaction energy. The test may be used to specify the compaction requirements for field control of earthworks.

Compaction test results are presented in Table 6.3-1.

**Table 6.3-1**Summary of Results from Modified Proctor Tests

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
Maximum Dry Unit Weight	- ASTM D 1557 -	17	113.4 to 128.9 lb/ft <sup>3</sup>	122 lb/ft <sup>3</sup>	4 lb/ft <sup>3</sup>
Optimum Moisture Content		17	7.4 to 14.4%	10%	2%

# 6.4 California Bearing Ratio

California Bearing Ratio (CBR) tests were also performed on bulk samples obtained in the upper 5 to 10 feet of material to evaluate its potential strength as a subgrade material. The CBR test measures the response of a compacted soil or aggregate to a bearing pressure. CBR values for each sample were determined at the optimum water content and maximum dry unit weight determined from Modified Proctor tests performed at the corresponding test locations.

CBR test results are presented in Table 6.4-1.

**Table 6.4-1**Summary of Results from California Bearing Ratio

Test <sup>[1]</sup>	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
CBR	ASTM D 1883	6	2.3 to 48	19	17
[1]Treated and untreated					

# 6.5 Resistance Value Testing

The RC performed resistance value (R-value) tests on bulk samples of material obtained in the upper 5 to 10 feet of the ground surface to evaluate soil strength as pavement subgrade material. In total, 18 R-value tests were performed on the material encountered and three of these tests were performed on material treated with 4% Quicklime Plus. The range of R-value



results at 300 psi exudation pressure and the mean value and standard deviation are shown in Table 6.5-1.

**Table 6.5-1**Summary of Results from R-Value Tests

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation	
R-value, untreated	ASTM D 2844	15	4 to 73	39	29	
R-value, treated <sup>[1]</sup>	ASTM D 2844	3	66 to 90	75	13	
[1] Treated with Quicklime Plus @4% by wet density (e.g., 4.8lbs of lime for 120lbs of wet soil)						

# 6.6 Expansion Index Testing

The RC performed an expansion index (EI) test on a selected sample of fill to evaluate its expansion potential when inundated with water. Table 6.7-1 provides the classification of potential expansion based on EI values. The EI value is shown in Table 6.7-1.

**Table 6.6-1** Expansion Classification

EI	Potential Expansion
0–20	very low
21–50	low
51–90	medium
91–130	high
>130	very high

**Table 6.6-2**Summary of Results from Expansion Index Testing

Test	Test Reference	No. of Tests	Result	
EI	ASTM D 2844	1	87.6	

# 6.7 Soil Corrosion Testing

Corrosion tests were performed on selected samples to evaluate the corrosion potential for buried iron, steel, mortar-coated steel, and reinforced concrete structures. Corrosion testing included pH level, minimum resistivity, and chloride and sulfate concentrations. Corrosion test results are presented in Table 6.7-1.



Table 6.7-1
Summary of Results from Soil Corrosion Tests

Test No. of Range of

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
Minimum Resistivity	ASTM G 57	5	399 to 6,284 ohm-cm	1,830 ohm- cm	2,498 ohm- cm
рН	ASTM D 4327	5	6.4 to 9.92	8	2
Chloride	ASTM D 4327	5	50 to 437 ppm	204 ppm	173 ppm
Sulfate	ASTM D 4327	5	24 ppm	24 to 963 ppm	474 ppm

For structural elements, Caltrans Corrosion Guidelines (2003) consider a site to be corrosive if one or more of the following conditions exist for the representative soil and/or water samples taken at the site:

- Resistivity is 1,000 ohm-cm or less.
- Chloride concentration is 500 parts per million or greater.
- Sulfate concentration is 2,000 parts per million or greater.
- pH is 5.5 or less.

# 6.8 Triaxial Compression Testing

Triaxial unconsolidated undrained compression (TXUU) and triaxial consolidated drained compression (TXCD) tests were performed to determine soil strength parameters. The labs conducted 35 TXUU tests in accordance with ASTM D2850 and 3 TXCD tests in accordance with USACE. The results are summarized in Table 6.8-1 and Table 6.8-2. Full results of the tests are included in Appendix E.

**Table 6.8-1**Summary of Undrained Shear Strength from TXUU Tests

Test	Test	No. of	Range of	Mean	Standard
	Reference	Tests	Cohesion	Value	Deviation
TXUU	ASTM D2850	35	913 to 5,261 psf	2,556 psf	1,107 psf



**Table 6.8-2**Summary of Effective Stress Friction Angles from TXCD Tests

Test	Test Reference	No. of Tests	Range of Effective Stress Friction Angles	Mean Value	Standard Deviation
TXCD	USACE	3	24.2° to 37.5°	32°	7°

# 6.9 Consolidation Testing

Consolidation tests were run on seven samples according to ASTM D 2435. A summary of the consolidation test specimens is presented in Table 6.9-1. To facilitate calculations of consolidation parameters, a specific gravity test was run on a sample in accordance with ASTM D 5550 test method. The result was 2.588 (boring S0071R).

**Table 6.9-1**Summary of Results from Consolidation Testing

Boring ID	Depth (ft)	Sampler Type	USCS*	Cε <sub>r</sub> Cε <sub>c</sub>		P <sub>p</sub> (Ksf)
S0073R	12–14	Shelby	ML	0.01-0.03	0.12-0.14	10–25
S0072R	105–110	Shelby	СН	0.01-0.04	0.23-0.24	14–30
S0071R	123–125	California Modified	СН	0.01-0.05	0.30	9–21
S0069R	6.5–8.5	Shelby	СН	Disturbed		
S0068R	67–69.5	Shelby	CL	0.01-0.02	0.16-0.17	16–33
S0066R	45–47	Shelby	CL or ML	0.01-0.02	0.14–0.15	12–24
S0065R	42–44.5	Shelby	CL	0.01-0.03	0.13-0.15	8–15

Note: Results are presented in Appendix E. \* ML: sandy silt, CH: fat clay, CL: clay

# 6.10 Groundwater Chemistry Testing

Two indices are useful to predict the potential for corrosion or scale formation of water:

• Langlier Saturation Index – The Langlier Index predicts the scaling of water based on the calcium carbonate equilibrium values. If the actual pH of water is below the calculated pH, the Langlier Index is negative, indicating that the water will dissolve calcium carbonate and that it will be corrosive, particularly if dissolved oxygen is present. If the actual pH of water is higher than the calculated pH, the Langlier Index is positive, indicating that incrustants (i.e., scaling) will likely occur.



• **Ryznar Stability Index** – The Ryznar Index predicts the tendency for scaling and corrosion. It is widely used to predict the reaction of metal in saturated subsurface conditions. Water is corrosive if the index is higher than 7 and incrusting if it is less than 7.

The Rothberg, Tamburini & Winsor, Inc. Corrosivity Index Calculator (AWWA 2011) can be used to calculate both the Langlier and Ryznar Indices. Each may be independently used to determine the corrosive nature of a given influent water.

Groundwater sampling was conducted in the installed standpipe piezometers to obtain samples for water chemistry tests. The analytical results may be used to determine the Langelier Saturation and Ryznar Stability indices. Groundwater chemistry test results are presented in Table 6.10-1.

**Table 6.10-1**Summary of Results from Groundwater Chemistry Tests

Test	Test Reference	Borehole ID					
rest		S0020R	S0068R	S0071R	S0072R		
рН	SM 4500-H+B	7.7	6.8	11.9	9.5		
Calcium (mg/L)	EPA 200.7	57.9	38.5	50.6	15.6		
Bicarbonate Alkalinity as CaCO <sub>3</sub> (mg/L)	SM 2320B	325	158	749	45		
Specific Conductance (umhos/cm)	SM 2510B	1,050	570	4,010	2,080		
Total Dissolved Solids (mg/L)	SM2320B	657	387	1,580	1,240		
Chloride (mg/L)	EPA300.0	74.6	16.9	259	431		
Sulfate as SO <sub>4</sub> (mg/L)	EPA300.0	66.2	109	184	244		

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# Section 7.0

Surface and Subsurface Conditions along Alignment

# 7.0 Surface and Subsurface Conditions along Alignment

# 7.1 Surface Conditions and Physical Setting

The CP2-3 alignment corridor spans from just north of E American Avenue south of Fresno to approximately one mile north of the Tulare-Kern County line. The alignment travels through primarily rural agricultural lands with intermittent zones of light industrial and residential land.

The alignment south of E American Avenue runs parallel with the BNSF mainline on its west side. Then, the alignment crosses to the east side of the BNSF at Conejo Avenue to bridge the Kings River Complex and bypasses Hanford to the east. The alignment crosses SR 198 before rejoining the BNSF and SR 43 north of Corcoran. On the northern edge of Corcoran the alignment swings to the east to bypass the town before rejoining the BNSF to the south. It runs on the west side of the BNSF as far as Alpaugh before moving to the west to bypass Allensworth. It crosses existing local roads, major highways/freeways, major railroads, rail spurs, evaporation basins, canals, rivers and watercourses.

A gentle slope of the vast alluvial fans extends from the Sierra Nevada in the east to the center of the SJV. The ground level along the CP2-3 study area is relatively flat, with a general downward gradient moving south along the alignment. Ground surface elevations measured at exploration locations range from about 186 to about 290 feet (NAVD88).

# 7.2 Generalized Subsurface Conditions

Subsurface soils have been characterized into three separate layers: (1) Existing Fill (2) Alluvial Fan and (3) Lacustrine Deposits. Based on the geologic map, Alluvial Fan units are prevalent in Fresno County while Lacustrine Deposits are more prevalent in Tulare County.

The Alluvial Fan is more prevalent throughout Fresno County is assumed to include the Modesto (Qf) and Riverbank (Qc) Formations as well as the Basin (Qb), Stream Channel (Qsc) and Sand Dunes (Qsd) deposits. A distinction was not made between these units because the investigation did not identify a discernible difference between their composition and engineering properties.

The Lacustrine (QI) Deposits are more prevalent in Tulare, where they have been mapped within the boundaries of the former Tulare Lake Bed. In general these units are softer and comprise sandy silts and sandy clay soils, with some deposits of fat clay.

The following sections describe the subsurface ground conditions encountered, including groundwater conditions and evidence of soil contamination.

#### 7.2.1 Existing Fill

Existing Fill encountered during the GI varied from 1 to 10 feet in thickness. Existing Fill encountered consists predominately of silty sand (SM), sand with silt (SP-SM), poorly graded sand (SP), silty clay (CL-ML), and sandy silt (ML), and contains varying amounts of fine gravel.

Historical records describing how Existing Fill was placed and compacted were not found during our investigation. The largest Existing Fill fragment encountered during the investigation was less than 1 inch in greatest dimension. However, the nature of drilling and sampling methods used and borehole spacing makes it difficult to quantify the maximum size of fragments in Existing Fill.

Existing Fill included surface pavements consisting of asphalt concrete, concrete, and aggregate base. An existing asphalt road was encountered while drilling S0066R approximately 10 feet bgs.



Laboratory tests performed on Existing Fill soils were geared towards index property determination and tests that support earthwork design because the bulk samples collected were highly disturbed and were taken from drilling cuttings. Laboratory tests performed are presented in Section 6.0 and included Modified Proctor Compaction, CBR, dry density and moisture content, fines content, Atterberg Limits, R-value, EI, and corrosivity.

# 7.2.2 Quaternary Alluvial Fan Deposit

Alluvial Fan (Qc, Qf, and Qsc) was encountered predominantly in Fresno County beneath Existing Fill to the maximum depth explored. USCS soil types encountered in the Alluvial Fan deposits consists of poorly graded sand (SP), silty sand (SM), clayey sand (SC), clay (CL), silty clay (CL-ML), borderline sandy silt (ML/SM), silt with sand (SP-SM) and silt (ML).

Hardpan soil was present within the Alluvial Fan layer at depths between 19 and 35 feet. Hardpan was encountered in borings in Fresno County to a maximum depth of approximately 35 feet and was generally only a few feet thick. Hardpan did present refusal to the CPT rig at some locations, but did not present refusal to auger. See the CPT logs in Appendix C and on the geotechnical cross section for locations where additional pre-drilling was necessary.

The results of geophysical testing (suspension velocity measurements) in borehole S0028R located near Conejo Avenue in Fresno County indicate thin cemented layers centered at 25, 48, 84, 97, 114, and 135 feet. These thin layers are represented by P- and horizontal S-wave velocity spikes shown in Figure 5.4-1 and in Appendix D.

# 7.2.3 Lacustrine Deposits

Lacustrine deposits (QI) were encountered in borings primarily in Tulare County beneath Existing Fill at depths of up to 94 feet. The deposits encountered are generally interspersed within layers of Alluvial Fan and basin deposits. USCS soil types encountered in the Lacustrine Deposits consist of fat clay (CH), lean clay (CL), silty clay (CL-ML), elastic silt (MH), silt and silt with sand (ML), sandy silt (ML/SM), silt with sand (ML), and silty sand (SM).

Hardpan soil was not encountered in Tulare County and no CPTs required predrilling.

# 7.2.4 Distribution of Soil Types

A histogram of USCS distributions encountered in the borings is shown in Figure 7.2-1. USCS distribution for Fresno County is shown in orange the distribution for Tulare County is shown in yellow.

No data are available from Kings County.



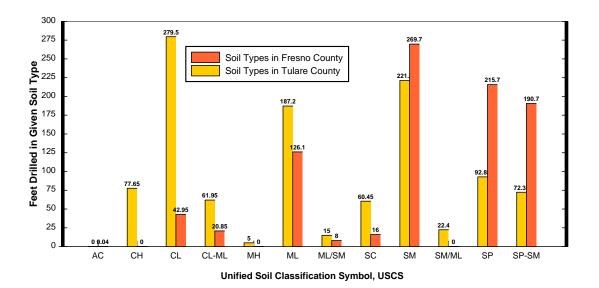


Figure 7.2-1
Unified Soil Classification System (USCS) Distribution Fresno County and Tulare County

The histogram shows the Fresno County Alluvial Fan materials consist of interbedded layers of poorly graded sand and silt, with varying amounts of coarse and fine grained particles. The histogram also presents the differing distributions of Tulare County Lacustrine deposits encountered.

A histogram of normalized CPT soil behavior type (SBT<sub>N</sub>) is shown in Figure 7.2-2. The SBT<sub>N</sub> classification was unified by Robertson (2010) with earlier SBT numbering from Robertson (1990) and may be used as a guide to predict soil behavior based on cone penetration resistance and sleeve friction.

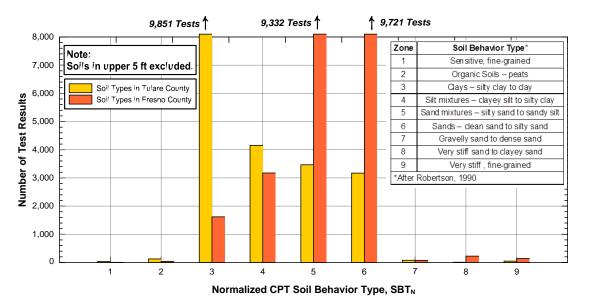


Figure 7.2-2

Normalized CPT Soil Behavior Type (SBT<sub>N</sub>) Distribution for Alluvial Fan



Figure 7.2-2 shows that the soil behavior types encountered Fresno County (orange) are predominantly of  $SBT_N 5$  and 6 with a lesser prevalence of soils of  $SBT_N 3$  and 4. The soil behavior types encountered in Tulare County (yellow) are predominately  $SBT_N 06$  3 and 4.

No data are available from Kings County.

#### 7.2.5 Distribution of N-Values

A profile of SPT N-values and California Modified N-values measured in Fresno County borehole is presented in Figure 7.2-3. The SPT N-values shown are generally representative of Alluvial Fan since this was the predominant soil type encountered. The values shown in have not been corrected for energy and field procedures; however, the California modified blow counts have been corrected for sampler size. Uncorrected SPT N-values range from 6 to greater than 100 blows (i.e., sampler refusal) and generally increase with depth.

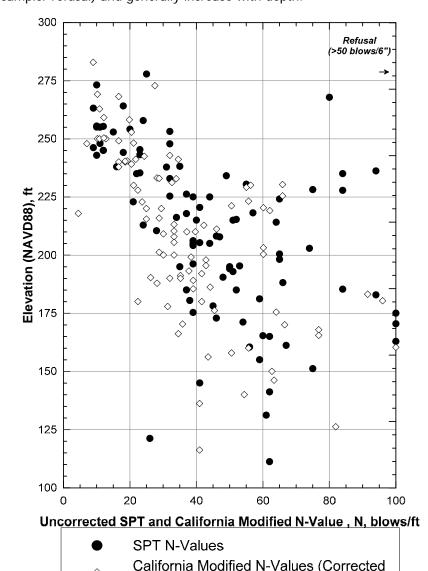


Figure 7.2-3
Fresno County: Profile of SPT N-Values

for sampler size by a factor of 0.64)



A profile of SPT N-values and California modified N-values measured in Tulare County is presented in Figure 7.2-4. The SPT N-values shown are generally lower than in Fresno County and suggest Lacustrine deposits may be present. The values shown in Figure 7.2-4 have not been corrected for energy and field procedures; however, the California modified blow counts have been corrected for sampler size. Uncorrected SPT N-values range from 4 to greater than 100 blows.

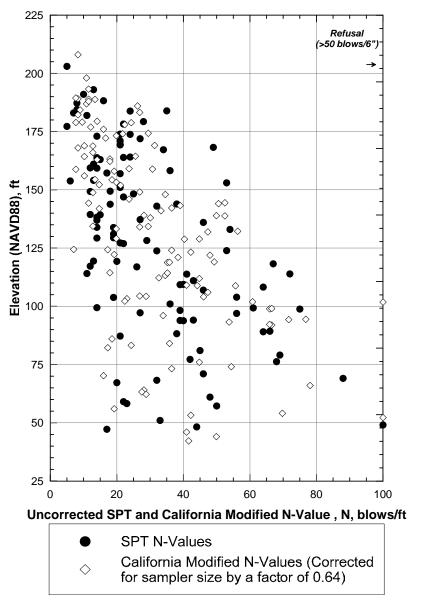


Figure 7.2-4
Tulare County: Profile of SPT N-Values

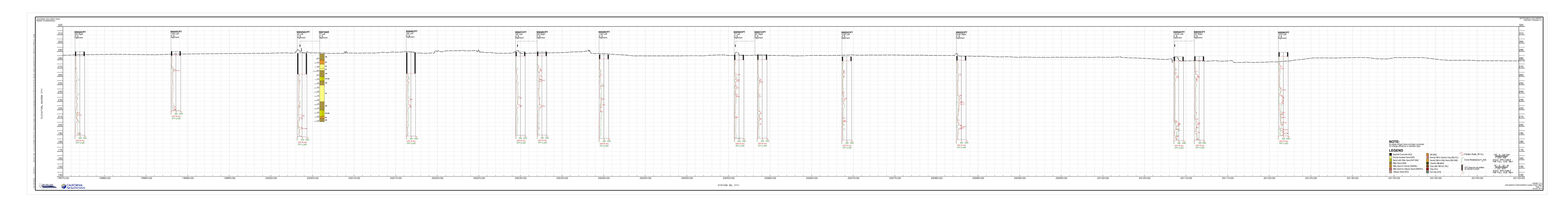
# 7.2.6 Subsurface Stratigraphy Cross-Section

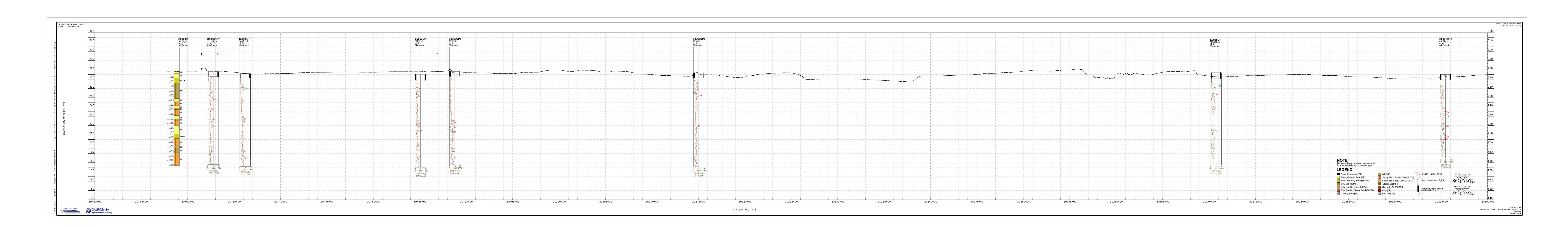
A cross-section profile of the subsurface stratigraphy is presented in **Figure 7.2-5** through **Figure 7.2-18**. The stationing presented in **Figure 7.2-5** through **Figure 7.2-18** differs from that in Table 1.2-2. The location of a particular boring or CPT should be considered approximate relative to that of nearby the alignment structures.

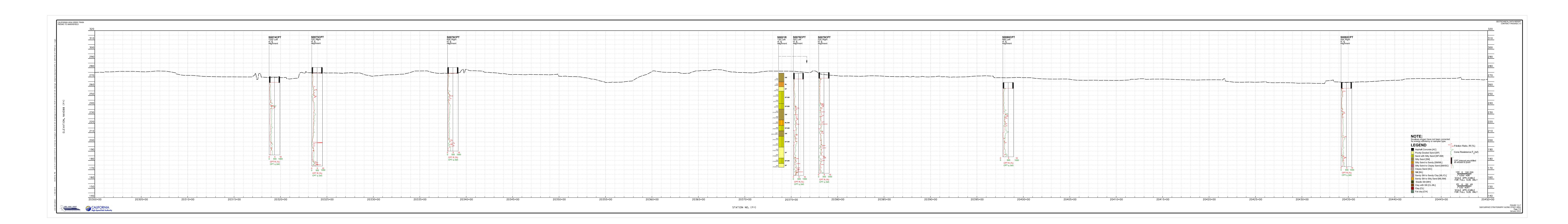


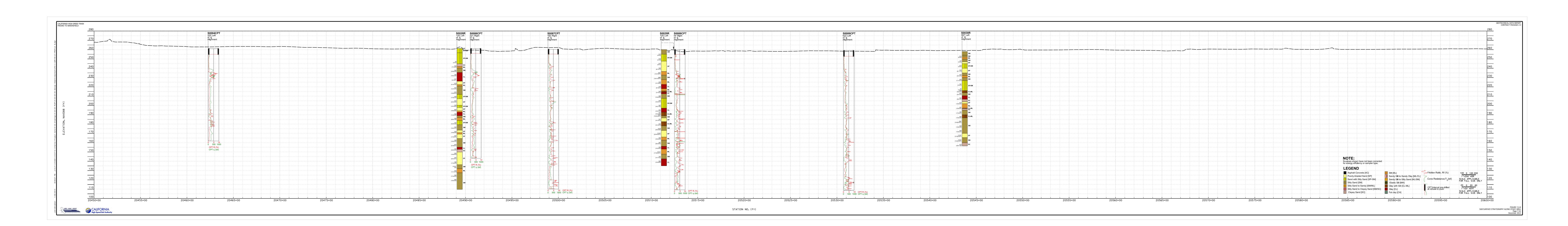
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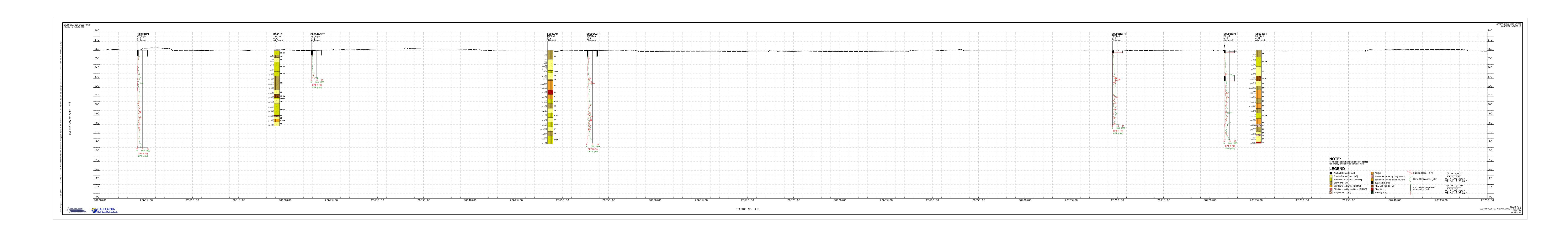


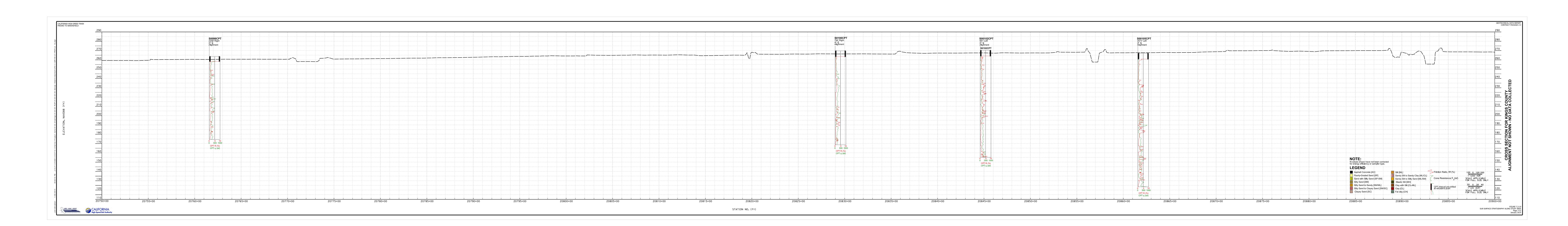


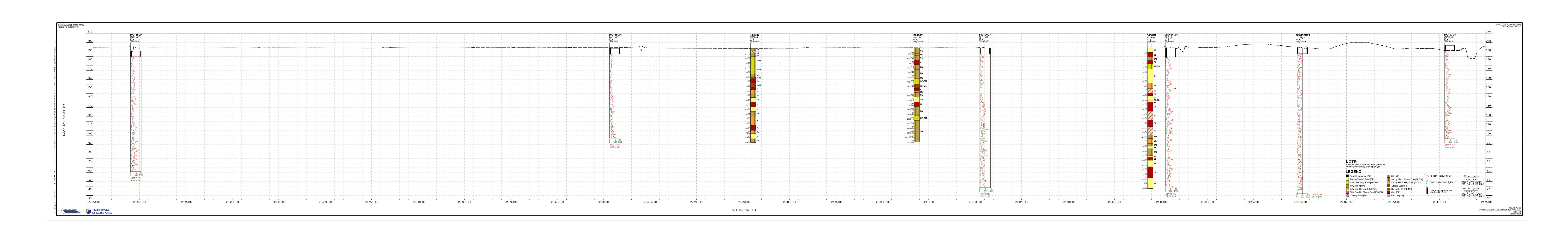


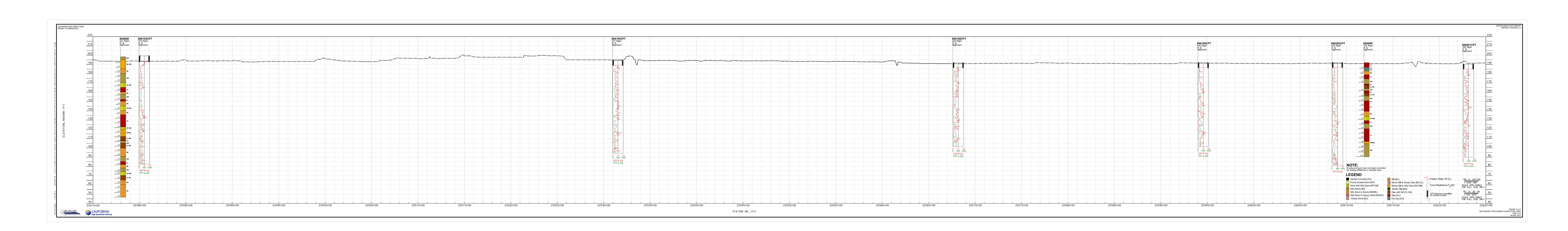


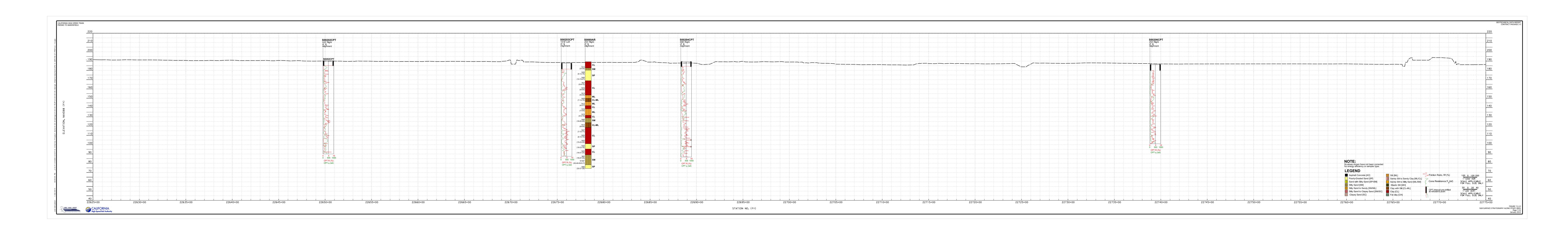


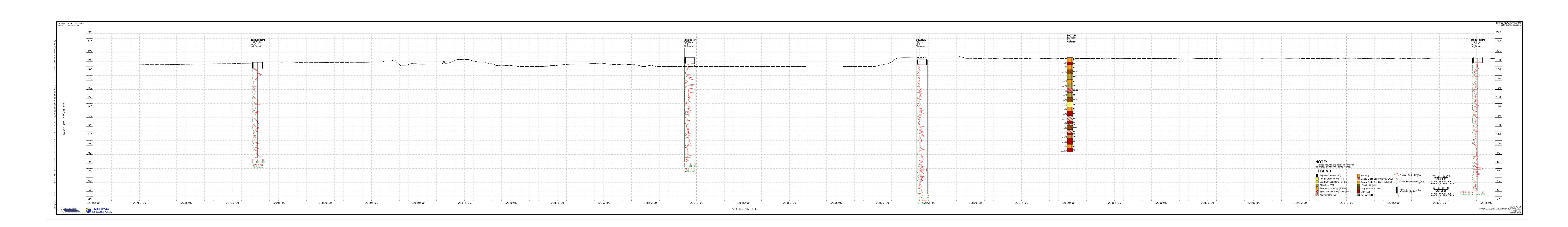


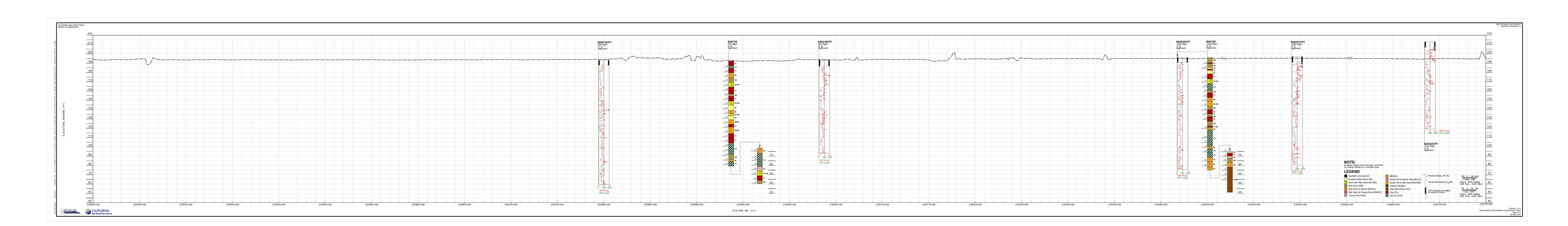


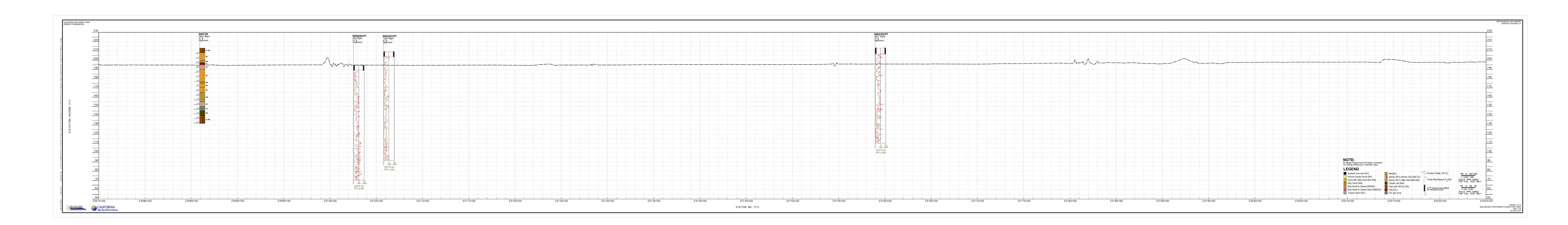


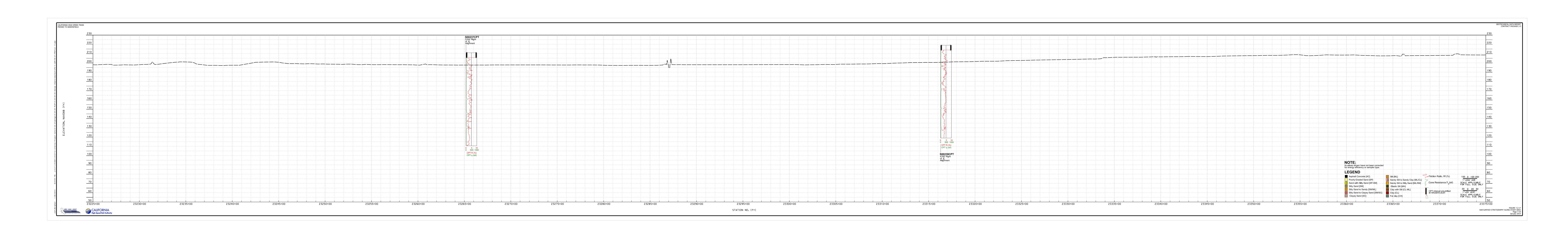


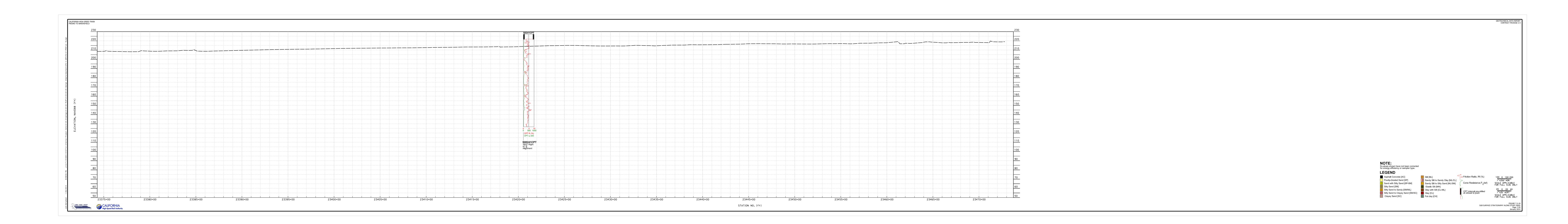












### 7.2.7 Contaminated Soil

The geotechnical investigation performed for Package 2-3 did not include desktop study or an environmental assessment of current or former hazardous substance cleanup sites, existing underground storage tanks (UST), landfills, or other nearby sites that could impact soil and groundwater along the proposed alignment.

During the exploration campaign, evidence of possible soil or groundwater contamination (odor, discoloration) was not noted in the boreholes or CPTs completed. However, current and historical land use in the vicinity indicates man-made hazardous materials may be present in soil and groundwater along the proposed alignments. Hazardous materials associated with man-made contamination can include petroleum hydrocarbons, volatile organic compounds, semivolatile organic compounds, pesticides, PCBs, and metals. These contaminants are usually associated with current and former agricultural, industrial, and/or commercial activities. Aerially deposited lead is common in soil along shoulders of major thoroughfares from past leaded fuel vehicle emissions.

Railroads have historically used lead arsenate or other arsenic compounds as pesticide and herbicide, as well as using chlorinated pesticides. Lead may also be present as lead-based paint debris or as aerially-deposited lead. PCBs were historically used in railroad electrical equipment.

#### 7.2.8 Groundwater Conditions

Monitoring of groundwater conditions was conducted in five standpipe piezometers installed during the GI. Groundwater-level measurements were generally not performed in boreholes during drilling due to the use of drilling fluid.

Results from piezometer measurements indicate the groundwater table is below 100 feet bgs in borehole S0029R, between 80 feet and 90 feet in S0020R, between 30 feet and 40 feet in S0068R and S0072R, and within 25 feet at S0071R. The results of piezometer measurements are presented in Table 5.5-2 and Figure 5.5-2. To date, groundwater levels measured in the majority of standpipe piezometers have not been subject to significant seasonal fluctuation. The relatively shallow groundwater indicated in S0071R may have been affected by fluctuating water levels in the adjacent irrigation canal (labeled Deer Creek in Figure B12).

Historical groundwater measurements along the alignment are presented in Table 4.3-1. Groundwater level observations from several CPTs are presented in Table 5.5-2.

#### 7.2.8.1 Perched Groundwater

Perched groundwater is known to prevalent in parts of Kings and Tulare Counties and may be as shallow as 5 to 15 feet. Perched groundwater was also observed in archeological trenches near Corcoran and shallow excavations for a solar farm near Alpaugh in Tulare County. There is a potential for perched groundwater to exist near existing irrigation ponds, watercourses, including detention basins and irrigation canals. Local perched water may also occur above hardpan layers.

There were no groundwater measurements taken during drilling, however, groundwater was measured shallower than 40 feet bgs in three of the standpipe piezometers installed: S0068R, S0071R, and S0072R, as shown in Figure 5.5-2.

The results of geophysical testing (suspension velocity measurements) indicate perched groundwater may be present between 65 and 70 feet bgs in Conejo (borehole S0028R) and around 32 feet and 45 feet bgs near Avenue 144 in Tulare County (borehole S0067R).



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Section 8.0 Limitations and Further Information

## 8.0 Limitations and Further Information

The RC warrants that its services were performed within the limits prescribed by our client for the project, in a manner consistent with the level of care and skill ordinarily exercised by members of the same profession currently practicing in the same locality under similar circumstances. No other warranty or representation, either expressed or implied, is included or intended hereunder.

This report contains results of a preliminary geotechnical study to support procurement. The geotechnical data presented in this report were collected based on the indicated project criteria and are intended only for the purposes, site location, and project described in this report. Conclusions drawn from the data presented herein are subject to change (1) based on future explorations to be performed by the Contractor, (2) when additional information on subsurface conditions becomes publicly available, (3) when key features of the project are changed during design, and/or (4) other circumstances not noted.

The RC cannot be held responsible for interpretations, professional opinions, or advice given by others with regard to any geotechnical data presented in this report.

Data within Kings County were not obtained in time for publication of this report. Additional data collection for Kings County portions of the alignment are planned pending access.

Additional explorations and/or analyses will be required to develop and prepare the *GBR for Construction*, which provides the basis for contracting the final design and construction. A geotechnical study for the project should reassess the geotechnical considerations and preliminary criteria presented in this report and include additional geotechnical explorations, laboratory testing, and engineering analyses deemed necessary by the design-build contractor's geotechnical engineer of record to provide geotechnical design parameters for the final design of the proposed structures.



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Section 9.0 References

## 9.0 References

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# **Appendix A**

Available Geotechnical Data from Previous Investigations

For gINT Database, see CD

**Table A-1**Summary of Available Geotechnical Data Collected from Previous Investigations within 5 Miles of the Preferred Alignment

Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
North Avenue Undercrossing	42 0264L As Builts_North Avenue UC.pdf	7/7/1965	42-264R/L	FBA0337h	B-1	41.5
North Avenue Undercrossing	42 0264L As Builts_North Avenue UC.pdf	7/7/1965	42-264R/L	FBA0338h	B-2	31.1
North Avenue Undercrossing	42 0264L As Builts_North Avenue UC.pdf	7/13/1965	42-264R/L	FBA0339h	B-3	12.9
North Avenue Undercrossing	42 0264L As Builts_North Avenue UC.pdf	7/13/1965	42-264R/L	FBA0340h	B-4	5.0
Church Avenue Undercrossing	42 0265L As Builts_Church Avenue UC.pdf	7/12/1965	42-265 R/L	FBA0341h	B-1	40.4
Church Avenue Undercrossing	42 0265L As Builts_Church Avenue UC.pdf	7/13/1965	42-265 R/L	FBA0342h	B-2	40.4
Church Avenue Undercrossing	42 0265L As Builts_Church Avenue UC.pdf	7/14/1965	42-265 R/L	FBA0343h	B-3	5.9
Church Avenue Undercrossing	42 0265L As Builts_Church Avenue UC.pdf	7/14/1965	42-265 R/L	FBA0344h	B-4	46.4
Jensen Ave. OC	42 0268 As Builts_Jensen Avenue OC.pdf	7/8/1965	42-268	FBA0345h	B-1	49.3
Jensen Ave. OC	42 0268 As Builts_Jensen Avenue OC.pdf	7/9/1965	42-268	FBA0346h	B-2	36.0
Jensen Ave. OC	42 0268 As Builts_Jensen Avenue OC.pdf	7/14/1965	42-268	FBA0347h	B-3	55.0
Jensen Ave. OC	42 0268 As Builts_Jensen Avenue OC.pdf	5/13/1969	42-268	FBA0348h	B-4	76.2
Jensen Ave. OC	42 0268 As Builts_Jensen Avenue OC.pdf	5/14/1969	42-268	FBA0349h	B-5	56.2
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/13/1965	42-266 R/L	FBA0350h	B-1	45.3
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/29/1967	42-266 R/L	FBA0351h	B-16	38.3
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/14/1965	42-266 R/L	FBA0352h	B-3	60.0
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/2/1971	42-266 R/L	FBA0353h	B-20	76.7
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/29/1967	42-266 R/L	FBA0354h	B-15	50.7
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/14/1965	42-266 R/L	FBA0355h	B-2	41.3
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/29/1967	42-266 R/L	FBA0356h	B-19	35.2
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/15/1965	42-266 R/L	FBA0357h	B-7	23.1
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	2/7/1995	42-266 R/L	FBA0373h	B-24	74.3
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	2/8/1995	42-266 R/L	FBA0374h	B-25	88.8
Central Avenue Overcrossing	42 0207 As Builts_Central Avenue OC.pdf	10/17/1959	42-207	FBA0809h	B-1	56.1
Central Avenue Overcrossing	42 0207 As Builts_Central Avenue OC.pdf	10/17/1959	42-207	FBA0810h	B-2	43.6
Central Avenue Overcrossing	42 0207 As Builts_Central Avenue OC.pdf	10/17/1959	42-207	FBA0811h	B-3	4.6
Central Avenue Overcrossing	42 0207 As Builts_Central Avenue OC.pdf	10/18/1959	42-207	FBA0812h	B-4	40.0



**Table A-1**Summary of Available Geotechnical Data Collected from Previous Investigations within 5 Miles of the Preferred Alignment

Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
Central Avenue Overcrossing	42 0207 As Builts_Central Avenue OC.pdf	10/18/1959	42-207	FBA0813h	B-5	7.7
Central Avenue Overcrossing	42 0207 As Builts_Central Avenue OC.pdf	10/18/1959	42-207	FBA0814h	B-6	52.5
South Calwa Overhead	42 0208L As Builts_South Calwa OH.pdf	10/20/1959	42-208 R/L	FBA0815h	B-1	51.8
South Calwa Overhead	42 0208L As Builts_South Calwa OH.pdf	10/20/1959	42-208 R/L	FBA0816h	B-2	54.2
South Calwa Overhead	42 0208L As Builts_South Calwa OH.pdf	10/20/1959	42-208 R/L	FBA0817h	B-3	15.8
South Calwa Overhead	42 0208L As Builts_South Calwa OH.pdf	10/21/1959	42-208 R/L	FBA0818h	B-4	57.4
South Calwa Overhead	42 0208L As Builts_South Calwa OH.pdf	10/21/1959	42-208 R/L	FBA0819h	B-5	59.6
South Calwa Overhead	42 0208L As Builts_South Calwa OH.pdf	10/21/1959	42-208 R/L	FBA0820h	B-6	16.4
South Calwa Overhead	42 0208L As Builts_South Calwa OH.pdf	10/20/1959	42-208 R/L	FBA0821h	B-7	56.9
Cedar Avenue Overcrossing	42 0209 As Builts_Cedar Avenue OC.pdf	10/19/1959	42-209	FBA0822h	B-1	56.5
Cedar Avenue Overcrossing	42 0209 As Builts_Cedar Avenue OC.pdf	10/19/1959	42-209	FBA0823h	B-2	43.0
Cedar Avenue Overcrossing	42 0209 As Builts_Cedar Avenue OC.pdf	10/19/1959	42-209	FBA0824h	B-3	50.0
Cedar Avenue Overcrossing	42 0209 As Builts_Cedar Avenue OC.pdf	10/19/1959	42-209	FBA0825h	B-4	56.4
Cedar Avenue Overcrossing	42 0209 As Builts_Cedar Avenue OC.pdf	10/19/1959	42-209	FBA0826h	B-5	45.0
Cedar Avenue Overcrossing	42 0209 As Builts_Cedar Avenue OC.pdf	10/19/1959	42-209	FBA0827h	B-6	20.0
North Avenue Overcrossing	42 0210 As Builts_North Avenue OC.pdf	10/22/1959	42-210	FBA0828h	B-1	48.4
North Avenue Overcrossing	42 0210 As Builts_North Avenue OC.pdf	10/21/1959	42-210	FBA0829h	B-2	55.8
North Avenue Overcrossing	42 0210 As Builts_North Avenue OC.pdf	10/21/1959	42-210	FBA0830h	B-3	41.8
North Avenue Overcrossing	42 0210 As Builts_North Avenue OC.pdf	10/23/1959	42-210	FBA0831h	B-4	45.0
North Avenue Overcrossing	42 0210 As Builts_North Avenue OC.pdf	10/21/1959	42-210	FBA0832h	B-5	47.5
Orange Avenue Overcrossing	42 0211 As Builts_Orange Avenue OC.pdf	10/23/1959	42-211	FBA0833h	B-1	47.4
Orange Avenue Overcrossing	42 0211 As Builts_Orange Avenue OC.pdf	10/23/1959	42-211	FBA0834h	B-2	52.0
Orange Avenue Overcrossing	42 0211 As Builts_Orange Avenue OC.pdf	10/23/1959	42-211	FBA0835h	B-3	8.3
Orange Avenue Overcrossing	42 0211 As Builts_Orange Avenue OC.pdf	10/22/1959	42-211	FBA0836h	B-4	31.7
Orange Avenue Overcrossing	42 0211 As Builts_Orange Avenue OC.pdf	10/26/1959	42-211	FBA0837h	B-5	7.5
Orange Avenue Overcrossing	42 0211 As Builts_Orange Avenue OC.pdf	10/22/1959	42-211	FBA0838h	B-6	8.3
West Calwa Spur Underpass	42 0212 As Builts_West Calwa UP.pdf	10/27/1959	42-212	FBA0839h	B-1	67.0



**Table A-1**Summary of Available Geotechnical Data Collected from Previous Investigations within 5 Miles of the Preferred Alignment

Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
West Calwa Spur Underpass	42 0212 As Builts_West Calwa UP.pdf	10/27/1959	42-212	FBA0840h	B-2	66.6
West Calwa Spur Underpass	42 0212 As Builts_West Calwa UP.pdf	10/28/1959	42-212	FBA0841h	B-3	66.2
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/28/1959	42-213	FBA0842h	B-1	52.9
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/28/1959	42-213	FBA0843h	B-2	52.0
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/29/1959	42-213	FBA0844h	B-3	11.6
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/29/1959	42-213	FBA0845h	B-4	53.8
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/29/1959	42-213	FBA0846h	B-5	62.5
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/29/1959	42-213	FBA0847h	B-6	19.5
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/29/1959	42-213	FBA0848h	B-7	9.1
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/29/1959	42-213	FBA0849h	B-8	9.5
Jensen Ave Undercrossing	42 0213 As Builts_Jensen Avenue UC.pdf	10/30/1959	42-213	FBA0850h	B-9	11.4
Church Avenue Overcrossing	42 0214 As Builts_Church Avenue OC.pdf	10/30/1959	42-214	FBA0851h	B-1	52.0
Church Avenue Overcrossing	42 0214 As Builts_Church Avenue OC.pdf	10/30/1959	42-214	FBA0852h	B-2	7.3
Church Avenue Overcrossing	42 0214 As Builts_Church Avenue OC.pdf	10/30/1959	42-214	FBA0853h	B-3	56.8
Cosmos Playground Pedestrian O.C.	42 0215 As Builts_Cosmos Playground POC.pdf	10/25/1960	42-215	FBA0854h	B-1	61.9
Cosmos Playground Pedestrian O.C.	42 0215 As Builts_Cosmos Playground POC.pdf	10/25/1960	42-215	FBA0855h	B-2	51.5
Cosmos Playground Pedestrian O.C.	42 0215 As Builts_Cosmos Playground POC.pdf	10/26/1960	42-215	FBA0856h	B-3	56.5
Cosmos Playground Pedestrian O.C.	42 0215 As Builts_Cosmos Playground POC.pdf	10/26/1960	42-215	FBA0857h	B-4	51.8
Cosmos Playground Pedestrian O.C.	42 0215 As Builts_Cosmos Playground POC.pdf	10/26/1960	42-215	FBA0858h	B-5	31.7
Cosmos Playground Pedestrian O.C.	42 0215 As Builts_Cosmos Playground POC.pdf	10/27/1960	42-215	FBA0859h	B-6	56.5
Lincoln Avenue Overcrossing	42 0144 As Builts_Lincoln Avenue OC.pdf	6/29/1965	42-0144	FBB0278h	B-1	53.2
Lincoln Avenue Overcrossing	42 0144 As Builts_Lincoln Avenue OC.pdf	6/30/1965	42-0144	FBB0279h	B-2	66.3
Lincoln Avenue Overcrossing	42 0144 As Builts_Lincoln Avenue OC.pdf	6/30/1965	42-0144	FBB0280h	B-3	81.0
Clayton Avenue Overcrossing	42 0152 As Builts_Clayton Avenue OC.pdf	6/29/1965	45-152	FBB0281h	B-1	90.3
Clayton Avenue Overcrossing	42 0152 As Builts_Clayton Avenue OC.pdf	6/29/1965	45-152	FBB0282h	B-2	55.6
Clayton Avenue Overcrossing	42 0152 As Builts_Clayton Avenue OC.pdf	6/29/1965	45-152	FBB0283h	B-3	62.0
American Avenue Overcrossing	42 0205 As Builts_American Avenue OC.pdf	10/13/1959	42-205	FBB0796h	B-1	75.1



**Table A-1**Summary of Available Geotechnical Data Collected from Previous Investigations within 5 Miles of the Preferred Alignment

Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
American Avenue Overcrossing	42 0205 As Builts_American Avenue OC.pdf	10/15/1959	42-205	FBB0797h	B-2	52.2
American Avenue Overcrossing	42 0205 As Builts_American Avenue OC.pdf	10/15/1959	42-205	FBB0798h	B-3	53.5
American Avenue Overcrossing	42 0205 As Builts_American Avenue OC.pdf	10/16/1959	42-205	FBB0799h	B-4	46.4
American Avenue Overcrossing	42 0205 As Builts_American Avenue OC.pdf	10/16/1959	42-205	FBB0800h	B-5	55.2
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/16/1959	42-206	FBB0801h	B-1	50.0
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/16/1959	42-206	FBB0802h	B-2	11.3
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/16/1959	42-206	FBB0803h	B-3	60.1
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/16/1959	42-206	FBB0804h	B-4	10.6
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/17/1959	42-206	FBB0805h	B-5	12.3
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/17/1959	42-206	FBB0806h	B-6	75.2
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/17/1959	42-206	FBB0807h	B-7	11.5
Chestnut Avenue Overcrossing	42 0206 As Builts_Chestnut Avenue OC.pdf	10/17/1959	42-206	FBB0808h	B-8	65.4
Kings River Alcorn Bridge (Widening)	45 0063 As Builts_Kings River.pdf	7/24/1984	45-63	FBC0443h	B-1	70.8
Kings River Alcorn Bridge (Widening)	45 0063 As Builts_Kings River.pdf	7/25/1984	45-63	FBC0444h	B-2	71.5
Kings River Bridge (Widening)	45 0064 As Builts_Kings River.pdf	3/30/1993	45-64	FBC0445h	B-1	66.2
Kings River Bridge (Widening)	45 0064 As Builts_Kings River.pdf	3/31/1993	45-64	FBC0446h	B-2	81.1
Kings River Bridge (Widening)	45 0064 As Builts_Kings River.pdf	4/6/1993	45-64	FBC0447h	B-3	70.8
Kings River Bridge (Widening)	45 0064 As Builts_Kings River.pdf	3/30/1993	45-64	FBC0448h	B-4	71.2
Kings River Bridge (Widening)	45 0064 As Builts_Kings River.pdf	4/5/1993	45-64	FBC0449h	B-5	49.5
Cole Slough (Widening)	42 0081 As Builts_Cole Slough.pdf	11/30/1989	42-81	FBC0453h	B-1	44.6
Cole Slough (Widening)	42 0081 As Builts_Cole Slough.pdf	11/30/1989	42-81	FBC0454h	B-2	34.5
Cole Slough (Widening)	42 0081 As Builts_Cole Slough.pdf	11/30/1989	42-81	FBC0455h	B-3	66.2
Cole Slough (Widening)	42 0081 As Builts_Cole Slough.pdf	11/30/1989	42-81	FBC0456h	B-4	38.6
Cole Slough (Widening)	42 0081 As Builts_Cole Slough.pdf	12/12/1989	42-81	FBC0457h	B-5	67.4
Cole Slough (Widening)	42 0081 As Builts_Cole Slough.pdf	12/13/1989	42-81	FBC0458h	B-6	67.6
Bridge Across East Branch Cross Creek	45 0053 As Builts_Each Branch Cross Creek.pdf	12/2/1952	45-53	FBD0432h	TH-1	58.5
Bridge Across East Branch Cross Creek	45 0053 As Builts_Each Branch Cross Creek.pdf	12/2/1982	45-53	FBD0433h	TH-2	18.0



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Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
Bridge Across East Branch Cross Creek	45 0053 As Builts_Each Branch Cross Creek.pdf	12/2/1952	45-53	FBD0434h	TH-3	48.1
East Branch Cross Creek (Widen)	45 0053 As Builts_Each Branch Cross Creek.pdf	2/11/1997	45-53	FBD0435h	97B-1	89.5
East Branch Cross Creek (Widen)	45 0053 As Builts_Each Branch Cross Creek.pdf	10/9/1997	45-53	FBD0436h	97B-2	79.6
East Branch Cross Creek (Widen)	45 0053 As Builts_Each Branch Cross Creek.pdf	10/10/1997	45-53	FBD0437h	97B-3	58.7
East Branch Cross Creek (Widen)	45 0053 As Builts_Each Branch Cross Creek.pdf	1/29/1997	45-53	FBD0438h	CPT-1	1.0
East Branch Cross Creek (Widen)	45 0053 As Builts_Each Branch Cross Creek.pdf	1/29/1997	45-53	FBD0439h	CPT-2	42.8
People's Ditch Bridge	45 0061 As Builts_Peoples Ditch.pdf	4/5/1993	45-61	FBD0440h	B-1	40.2
People's Ditch Bridge	45 0061 As Builts_Peoples Ditch.pdf	4/7/1993	45-61	FBD0441h	B-2	46.5
People's Ditch Bridge	45 0061 As Builts_Peoples Ditch.pdf	4/7/1993	45-61	FBD0442h	B-3	46.4
Geotechnical Investigation Report Proposed Monument Signs City of Corcoran	Geotechnical Investigation Report_Proposed Monument Signs_9-14-2009.pdf	8/14/2009	G09-102-11F	FBD1232h	B-101	10.0
Geotechnical Investigation Report Proposed Monument Signs City of Corcoran	Geotechnical Investigation Report_Proposed Monument Signs_9-14-2009.pdf	8/14/2009	G09-102-11F	FBD1233h	B-102	10.0
Geotechnical Investigation Report Proposed Monument Signs City of Corcoran	Geotechnical Investigation Report_Proposed Monument Signs_9-14-2009.pdf	8/14/2009	G09-102-11F	FBD1234h	B-201	10.0
Geotechnical Investigation Report Proposed Monument Signs City of Corcoran	Geotechnical Investigation Report_Proposed Monument Signs_9-14-2009.pdf	8/14/2009	G09-102-11F	FBD1235h	B-202	10.0
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1236h	B-1	21.5
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1237h	B-2	21.5
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1238h	B-3	21.5
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1239h	B-4	26.5
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1240h	B-5	21.5
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1241h	B-6	26.5



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Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1242h	B-9	11.5
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1243h	CPT-1	50.0
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1244h	CPT-2	50.0
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1245h	CPT-3	50.0
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1246h	CPT-4	50.0
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1247h	B-7	21.5
Geotechnical Investigation City of Corcoran Arsenic Removal Water Treatment Plant	Geotechnical Investigation_Arsenic Removal Water Treatment Plan_5-16-2008.pdf	3/18/2005	G05-064-11B	FBD1248h	B-8	25.0
Route 43/198 Separation	45 0080 As Builts_Route 43-198 Separation.pdf	2/24/1964	45-80	FBE0450h	B-1	50.0
Route 43/198 Separation	45 0080 As Builts_Route 43-198 Separation.pdf	2/25/1964	45-80	FBE0451h	B-2	57.2
Route 43/198 Separation	45 0080 As Builts_Route 43-198 Separation.pdf	2/25/1964	45-80	FBE0452h	B-3	70.4
Cross Creek Bridge	45 0006 As Builts_Cross Creek.pdf	5/31/1990	45-06	FBE0947h	B-1	15.2
Cross Creek Bridge	45 0006 As Builts_Cross Creek.pdf	5/31/1990	45-06	FBE0948h	B-2	52.3
Cross Creek Bridge	45 0006 As Builts_Cross Creek.pdf	5/31/1990	45-06	FBE0949h	B-3	30.0
Cross Creek Bridge	45 0006 As Builts_Cross Creek.pdf	6/14/1990	45-06	FBE0950h	B-4	47.0
Cross Creek Bridge	45 0006 As Builts_Cross Creek.pdf	6/14/1990	45-06	FBE0951h	B-5	47.0
10th. Avenue Overcrossing	45 0039 As Builts_10th avenue OC.pdf	7/2/1963	45-39	FBE0952h	B-1	62.5
10th. Avenue Overcrossing	45 0039 As Builts_10th avenue OC.pdf	7/2/1963	45-39	FBE0953h	B-2	56.1
10th. Avenue Overcrossing	45 0039 As Builts_10th avenue OC.pdf	7/2/1963	45-39	FBE0954h	B-3	44.7
10th. Avenue Overcrossing	45 0039 As Builts_10th avenue OC.pdf	7/2/1963	45-39	FBE0955h	B-4	72.9
Tule River	46 0122 As Builts_Tule River Bridge.pdf	6/30/1971	46-122	FBF0429h	B-1	75.7
Tule River	46 0122 As Builts_Tule River Bridge.pdf	7/7/1971	46-122	FBF0430h	B-2	59.6



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Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
Tule River	46 0122 As Builts_Tule River Bridge.pdf	7/1/1971	46-122	FBF0431h	B-3	75.2
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/6/1963	42-226 R/L	FBA0284h	B-4	34.0
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/6/1963	42-226 R/L	FBA0285h	B-3	46.0
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/27/1963	42-226 R/L	FBA0286h	B-28	40.6
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/11/1963	42-226 R/L	FBA0287h	B-6	45.9
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/27/1963	42-226 R/L	FBA0288h	B-29	42.7
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/26/1963	42-226 R/L	FBA0289h	B-26	2.2
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	10/29/1979	42-266 R/L	FBA0358h	B-22	81.5
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/29/1967	42-266 R/L	FBA0359h	B-17	43.5
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/28/1967	42-266 R/L	FBA0360h	B-14	20.9
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/15/1965	42-266 R/L	FBA0361h	B-8	41.6
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	10/27/1971	42-266 R/L	FBA0362h	B-21	76.5
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/15/1965	42-266 R/L	FBA0363h	B-6	48.7
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/28/1967	42-266 R/L	FBA0364h	B-18	61.4
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/28/1967	42-266 R/L	FBA0365h	B-11	27.1
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/15/1965	42-266 R/L	FBA0366h	B-9	28.8
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	10/28/1971	42-266 R/L	FBA0367h	B-23	74.5
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/29/1967	42-266 R/L	FBA0368h	B-10	69.8
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/28/1967	42-266 R/L	FBA0369h	B-13	29.2
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	11/28/1967	42-266 R/L	FBA0370h	B-12	33.6
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/15/1965	42-266 R/L	FBA0371h	B-5	9.9
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	7/14/1965	42-266 R/L	FBA0372h	B-4	34.9
Route 41/99 Separation	42 0266L As Builts_Route 41-99 Separation.pdf	5/12/1995	42-266 R/L	FBA0375h	B-26	98.6
Route 99 On-Ramp Overcrossing	42 0216F As Builts_S41-S99 Connector Separation.pdf	10/27/1960	42-216	FBA0860h	B-1	46.5
Route 99 On-Ramp Overcrossing	42 0216F As Builts_S41-S99 Connector Separation.pdf	10/28/1960	42-216	FBA0861h	B-2	66.5



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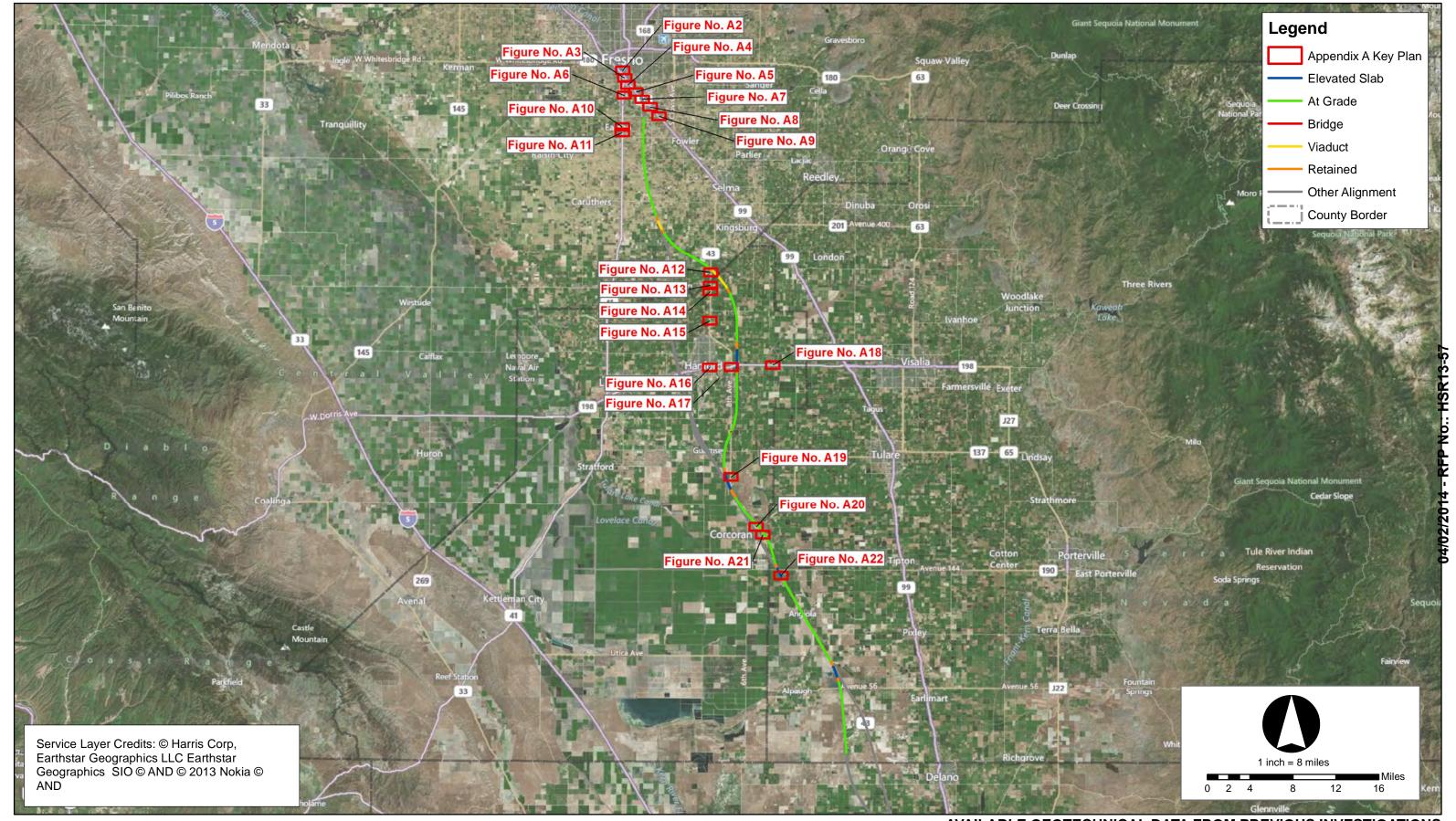
Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
Route 99 On-Ramp Overcrossing	42 0216F As Builts_S41-S99 Connector Separation.pdf	11/1/1960	42-216	FBA0862h	B-3	29.5
Route 99 On-Ramp Overcrossing	42 0216F As Builts_S41-S99 Connector Separation.pdf	11/1/1960	42-216	FBA0863h	B-4	51.5
Route 99 On-Ramp Overcrossing	42 0216F As Builts_S41-S99 Connector Separation.pdf	11/1/1960	42-216	FBA0864h	B-5	37.7
Route 99 On-Ramp Overcrossing	42 0216F As Builts_S41-S99 Connector Separation.pdf	11/7/1960	42-216	FBA0865h	B-6	26.5
California Avenue Overcrossing	42 0217 As Builts_California Avenue OC.pdf	11/2/1960	42-217	FBA0866h	B-1	51.0
California Avenue Overcrossing	42 0217 As Builts_California Avenue OC.pdf	11/2/1960	42-217	FBA0867h	B-2	49.0
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/26/1963	42-226 R/L	FBA0290h	B-27	50.1
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/12/1963	42-226 R/L	FBA0291h	B-7	55.5
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/26/1963	42-226 R/L	FBA0292h	B-23	20.8
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/12/1963	42-226 R/L	FBA0293h	B-8	51.0
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/25/1967	42-226 R/L	FBA0294h	B-22	6.6
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/25/1963	42-226 R/L	FBA0295h	B-21	7.4
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/25/1963	42-226 R/L	FBA0296h	B-20	3.5
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/25/1963	42-226 R/L	FBA0297h	B-19	7.1
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/25/1963	42-226 R/L	FBA0298h	B-18	44.7
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/26/1963	42-226 R/L	FBA0299h	B-24	41.0
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/26/1963	42-226 R/L	FBA0300h	B-25	46.4
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/7/1963	42-226 R/L	FBA0301h	B-5	24.3
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/21/1963	42-226 R/L	FBA0302h	B-17	65.2
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/20/1963	42-226 R/L	FBA0303h	B-13	27.0
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/20/1963	42-226 R/L	FBA0304h	B-16	59.3
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/20/1963	42-226 R/L	FBA0305h	B-14	7.9
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/14/1963	42-226 R/L	FBA0306h	B-9	51.3
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/20/1963	42-226 R/L	FBA0307h	B-15	13.7



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Report Name	File Name	Date Completed	Caltrans Structure Number	Designated Hole ID	Original Hole ID	Hole Depth (ft)
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/20/1963	42-226 R/L	FBA0308h	B-12	51.3
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/18/1963	42-226 R/L	FBA0309h	B-10	70.2
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/19/1963	42-226 R/L	FBA0310h	B-11	65.0
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	12/11/1963	42-226 R/L	FBA0311h	B-30	121.8
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/5/1963	42-226 R/L	FBA0312h	B-1	46.4
South Fresno Viaduct	42 0226L As Builts_South Fresno Viaduct.pdf	6/5/1963	42-226 R/L	FBA0313h	B-2	27.4
Van Ness Avenue Undercrossing	42 0227S As Builts_Van Ness Avenue UC.pdf	10/16/1969	42-227 QR	FBA0323h	1 (42-2270	55.6
Broadway On-Ramp OC & Retaining Walls 2 & 4	42 0229K As Builts_San Benito Street UC.pdf	12/17/1963	42-229	FBA0332h	B-1	69.7
Broadway On-Ramp OC & Retaining Walls 2 & 4	42 0229K As Builts_San Benito Street UC.pdf	12/17/1963	42-229	FBA0333h	B-2	40.0
Broadway On-Ramp OC & Retaining Walls 2 & 4	42 0229K As Builts_San Benito Street UC.pdf	12/17/1963	42-229	FBA0335h	B-4	35.8
Ventura Street Overcrossing	42 0158E As Builts_Ventura Street OC.pdf	11/9/1960	42-158	FBA0687h	B-1	51.5
California Avenue Overcrossing	42 0217 As Builts_California Avenue OC.pdf	11/3/1960	42-217	FBA0868h	B-3	46.5
California Avenue Overcrossing	42 0217 As Builts_California Avenue OC.pdf	11/4/1960	42-217	FBA0869h	B-4	51.5
Route 99 Off Ramp Overcrossing	42 0218K As Builts_Route 99 SB off-ramp-Route 99 Separation.pdf	11/8/1960	42-218	FBA0870h	B-1	51.5
Route 99 Off Ramp Overcrossing	42 0218K As Builts_Route 99 SB off-ramp-Route 99 Separation.pdf	11/8/1960	42-218	FBA0871h	B-2	46.5
Route 99 Off Ramp Overcrossing	42 0218K As Builts_Route 99 SB off-ramp-Route 99 Separation.pdf	11/8/1960	42-218	FBA0872h	B-3	51.5







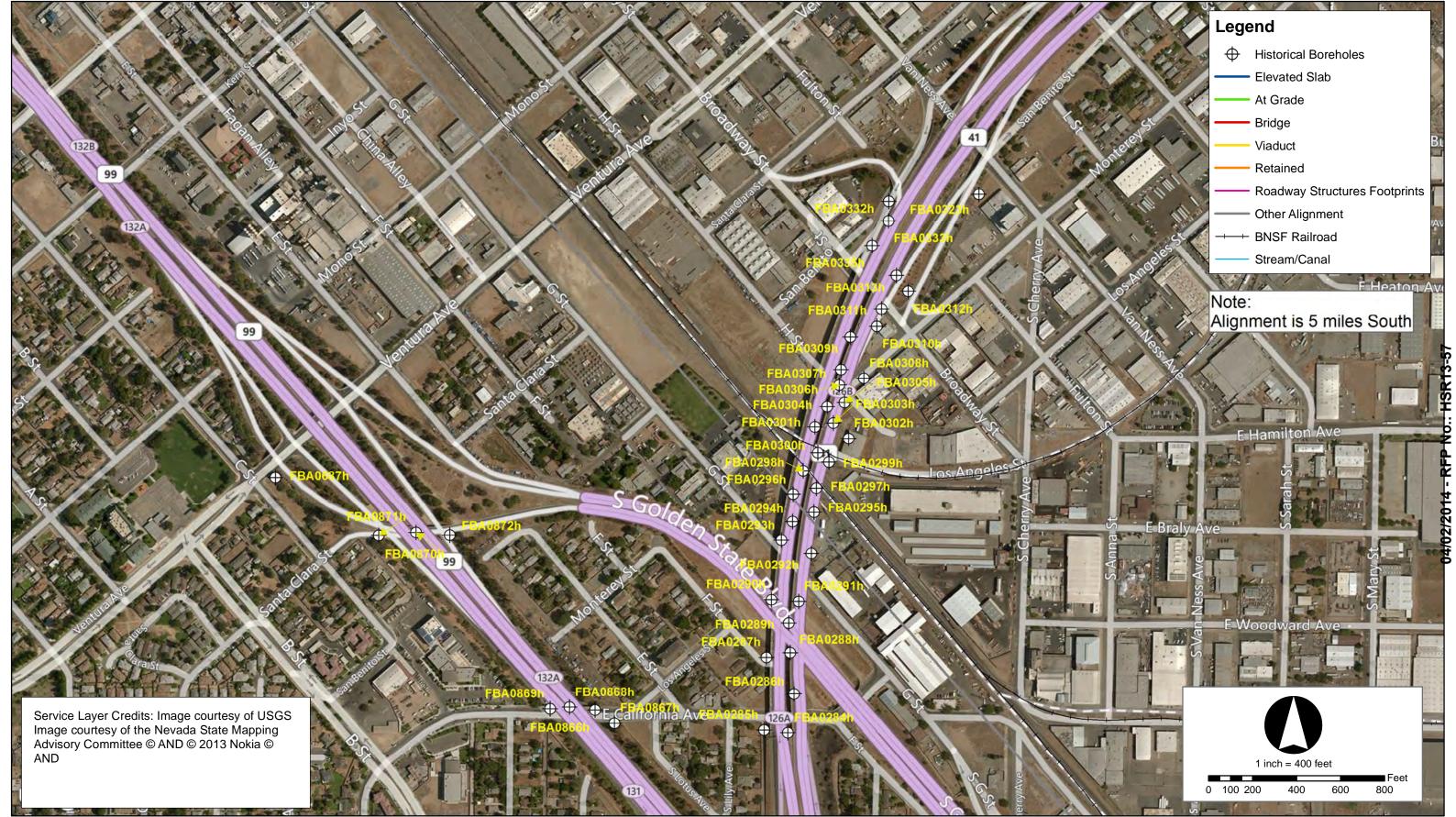


AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS

California High Speed Train

Fresno to Bakersfield

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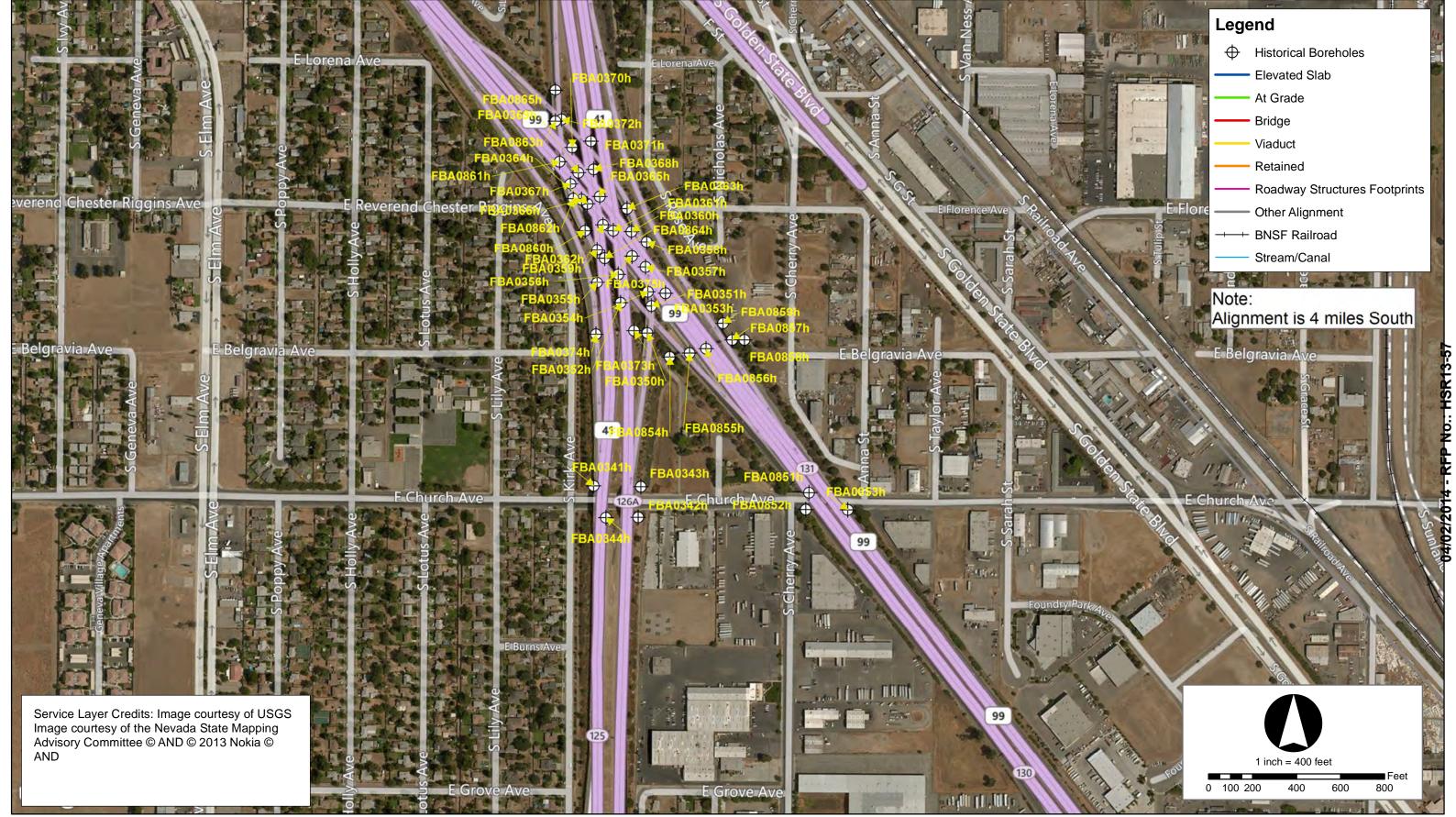


AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS

California High Speed Train

Fresno to Bakersfield

Geotechnical Data Report - Package 2-3







AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS
California High Speed Train

Fresno to Bakersfield

**Geotechnical Data Report - Package 2-3** 







AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS
California High Speed Train

Fresno to Bakersfield







AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS

California High Speed Train

Fresno to Bakersfield







AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS

California High Speed Train

Fresno to Bakersfield

Geotechnical Data Report - Package 2-3





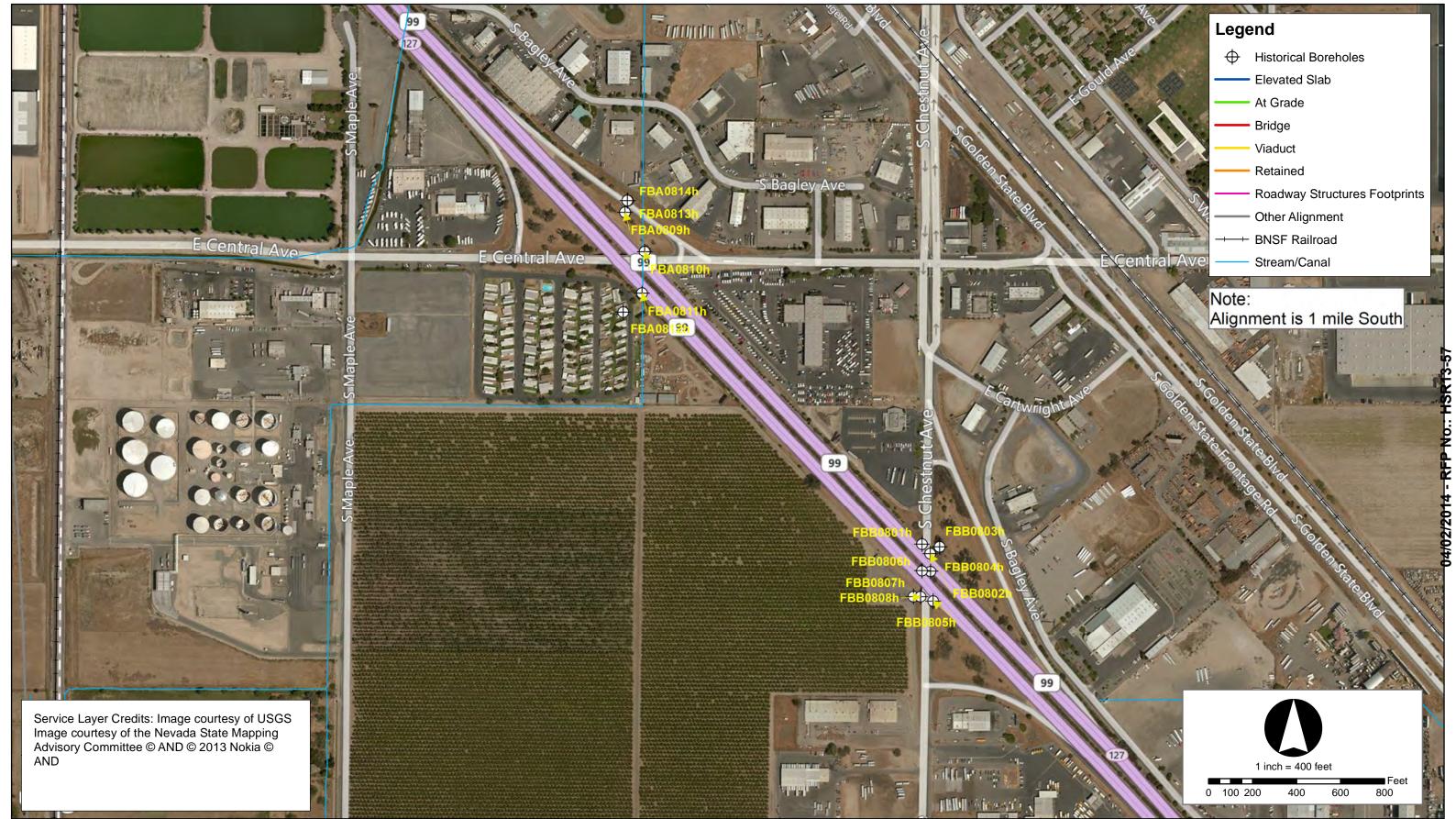


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California High Speed Train

Fresno to Bakersfield

Geotechnical Data Report - Package 2-3





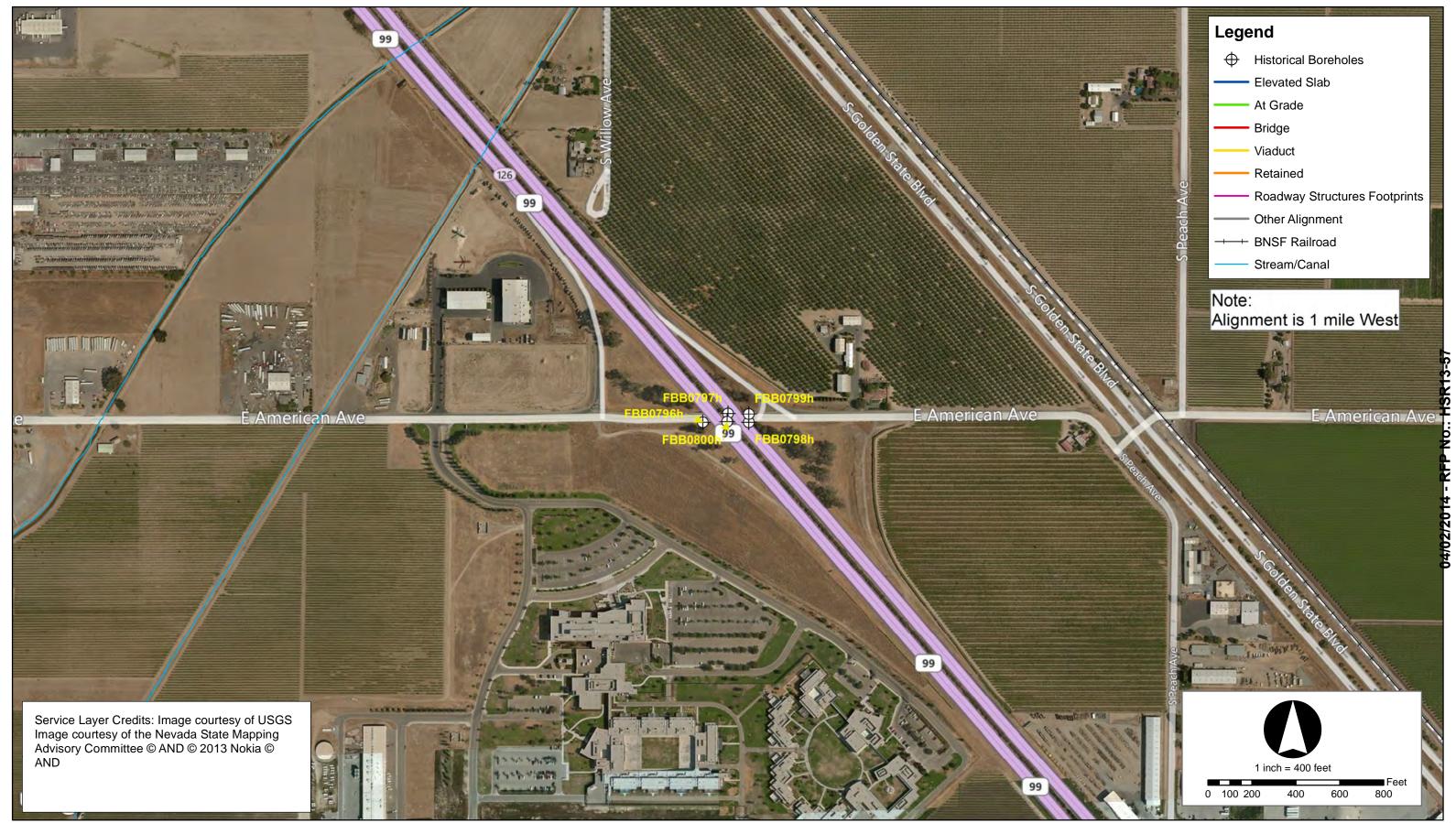


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California High Speed Train

Fresno to Bakersfield

Geotechnical Data Report - Package 2-3













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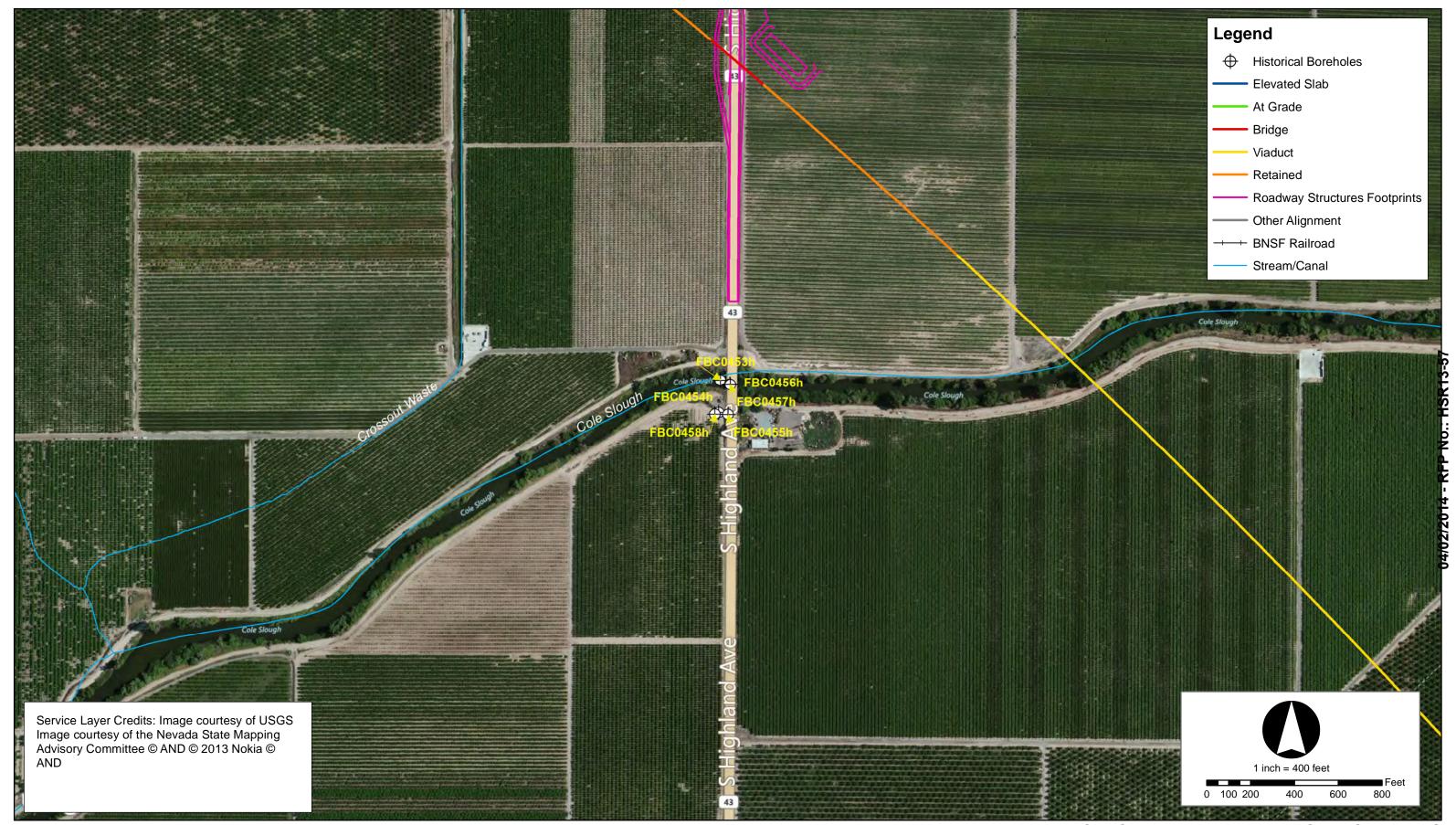
California High Speed Train

Fresno to Bakersfield



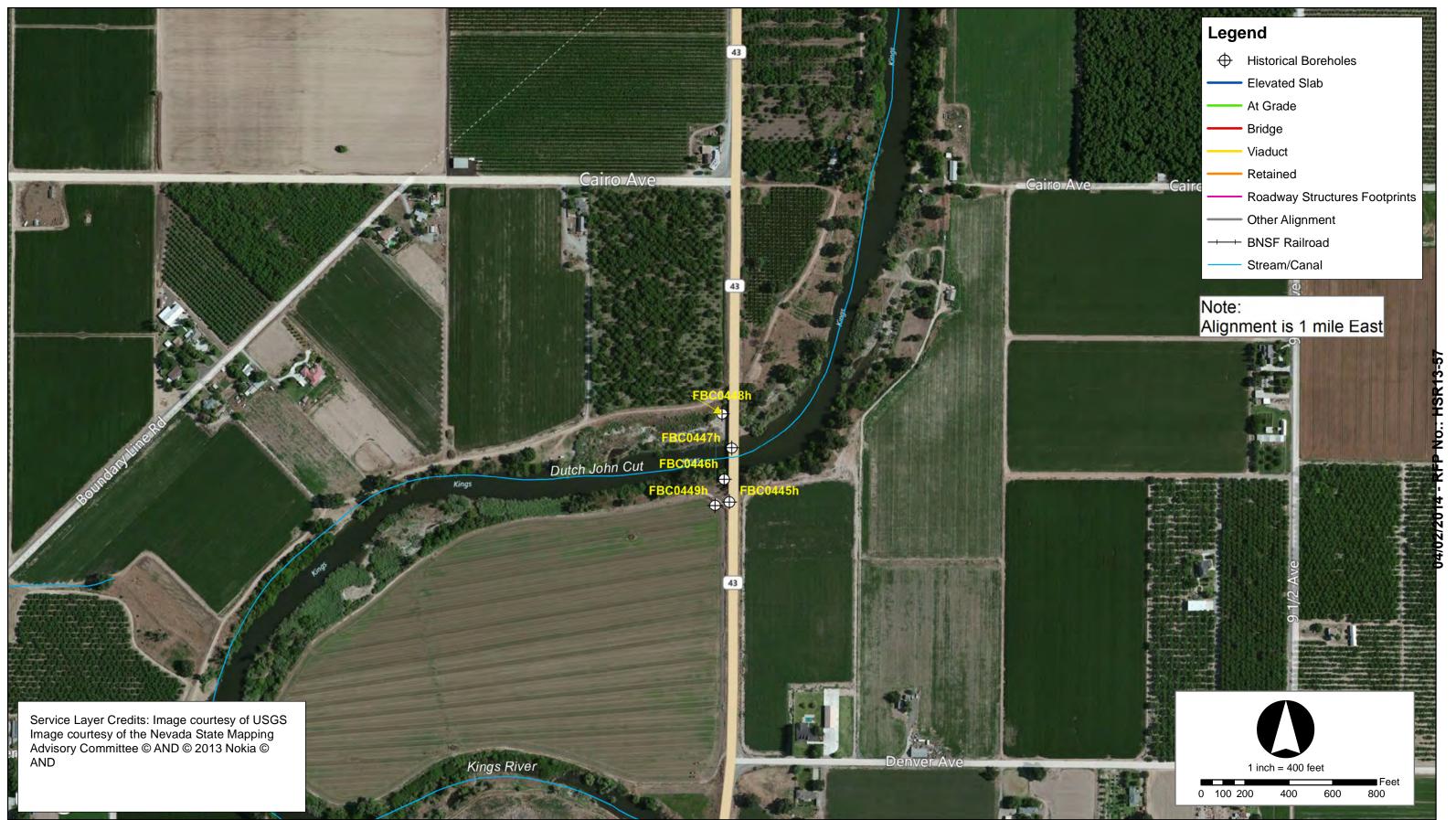














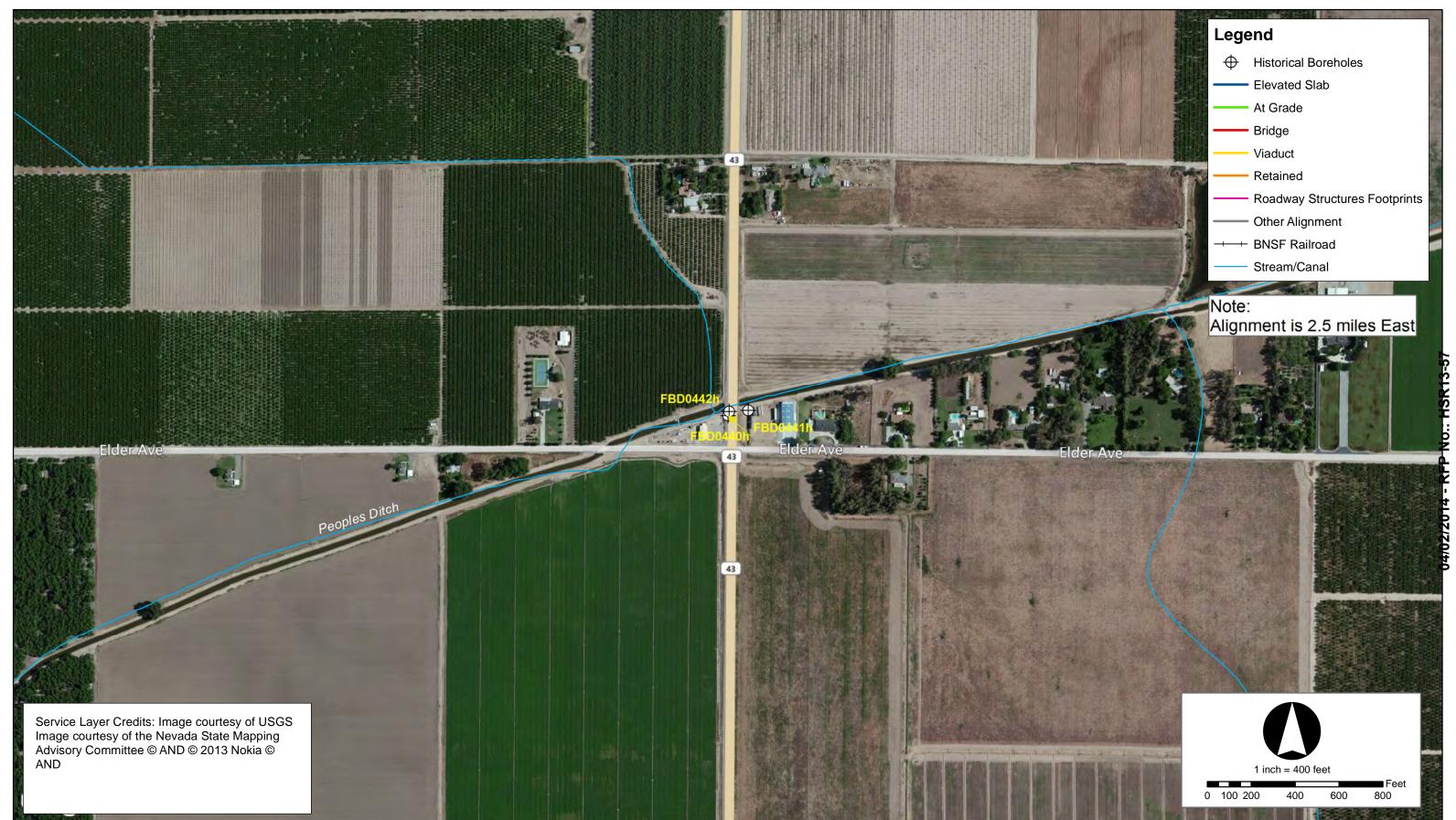








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California High Speed Train

Fresno to Bakersfield

Geotechnical Data Report - Package 2-3



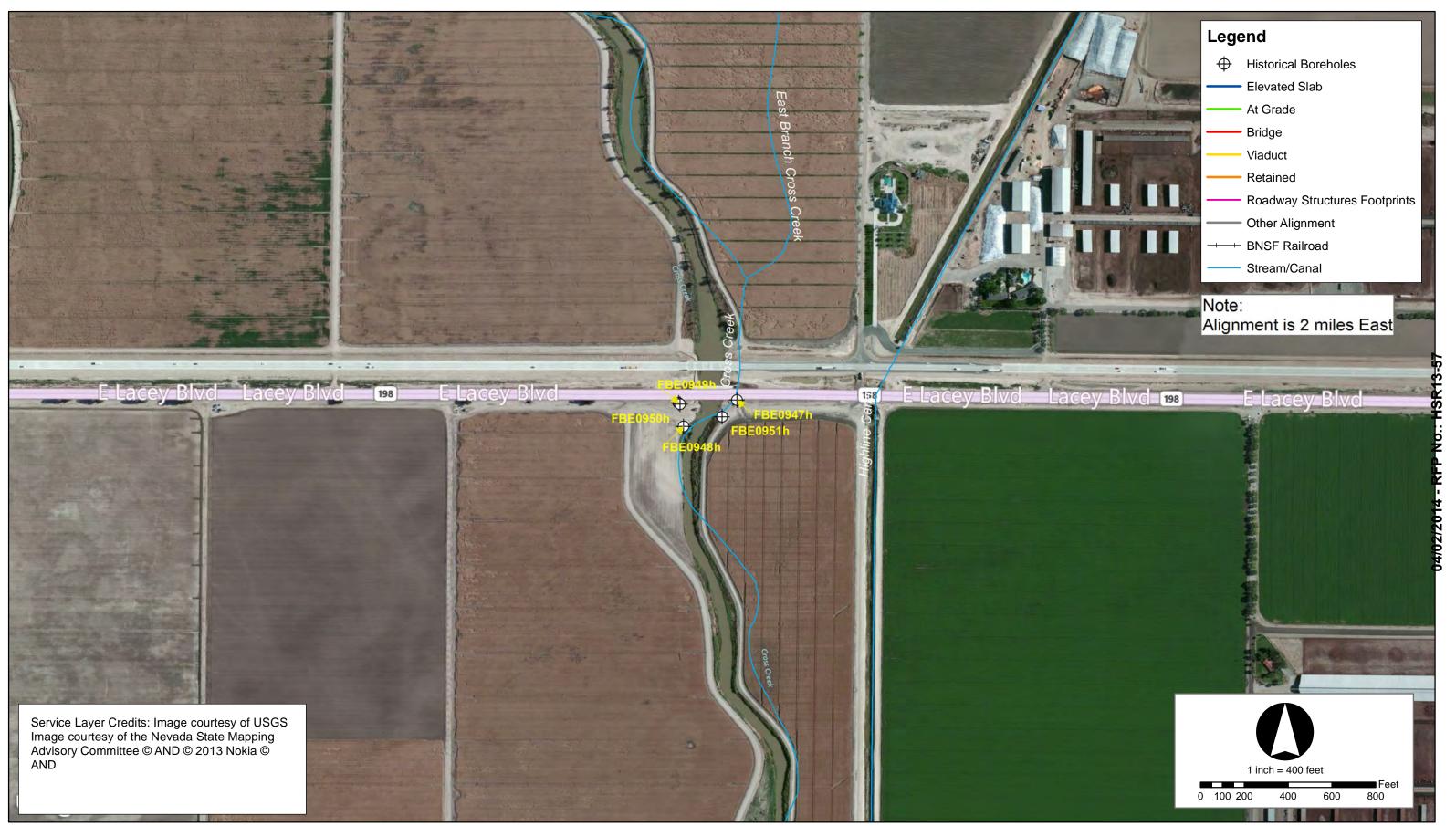






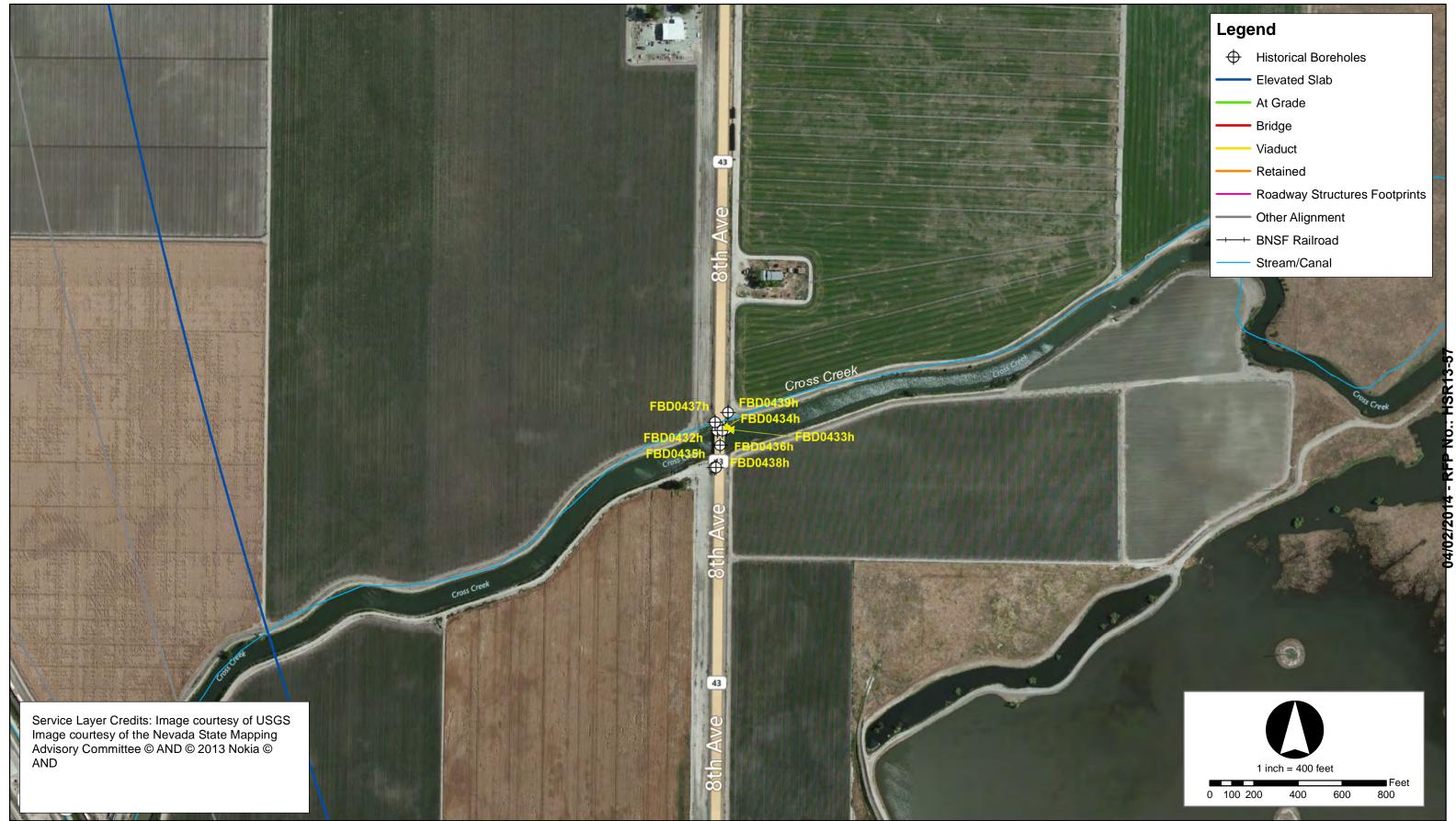




























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AVAILABLE GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS

California High Speed Train

Fresno to Bakersfield

**Geotechnical Data Report - Package 2-3** 

Appendix B Exploratory Borehole Records

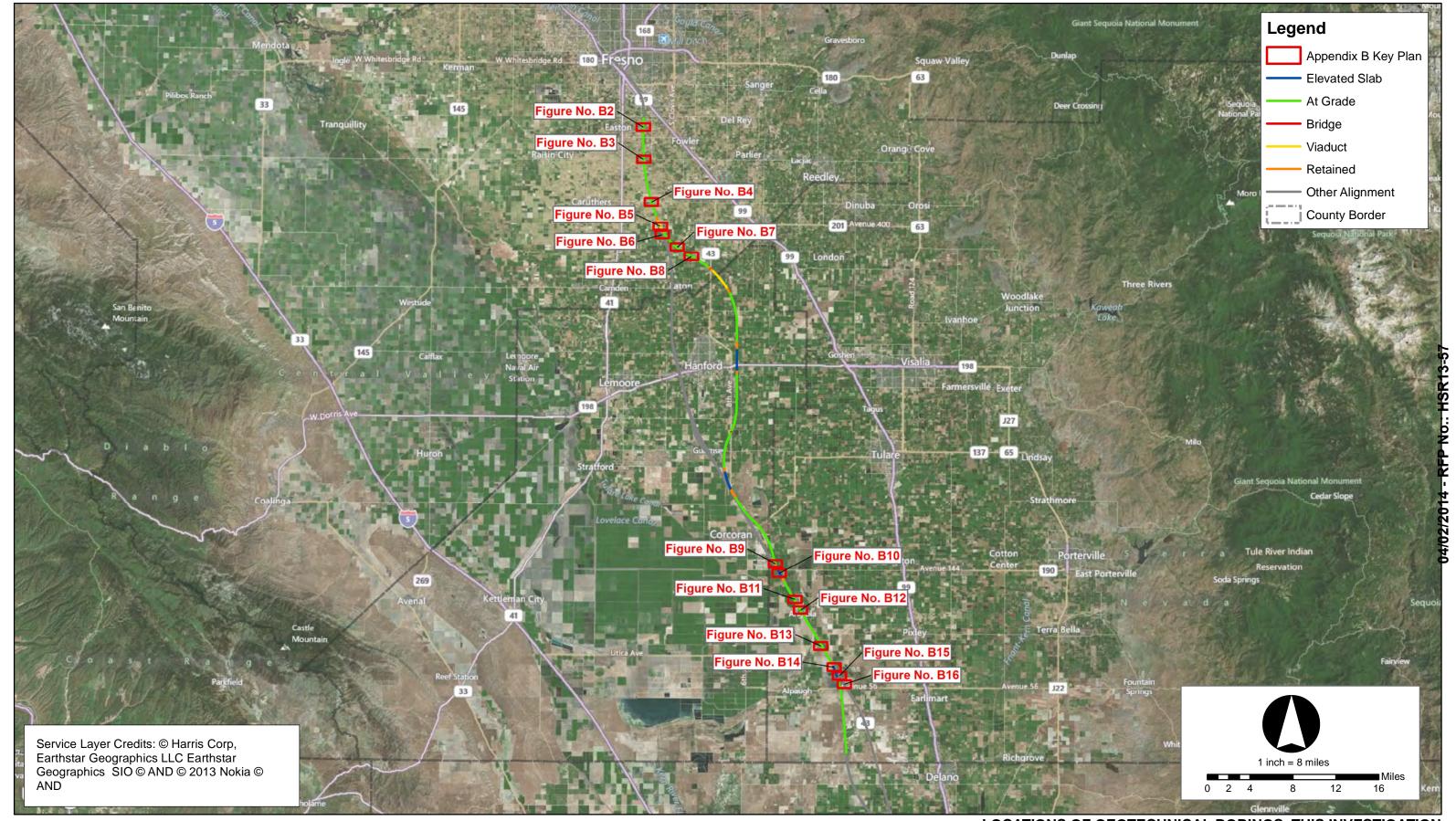
For gINT Database, see CD

**Table B-1**Summary of Exploratory Borehole Locations, Depths, and In Situ Testing

Borehole ID	Northing NAD 83 (ft)	Easting NAD 83 (ft)	Elevation NAVD88 (ft)	Hand-Auger / Pre-Drill Depths (ft)	Total Depth of Drilling (ft)	In Situ Testing	
						PS <sup>[1]</sup>	PZ <sup>[2]</sup>
S0019AR	6,341,412	2,120,192	287.9	0 to 5	81.5		
S0020R	6,341,583	2,104,379	278.2	0 to 5	101.5		✓
S0021R	6,345,376	2,083,243	274.2	0 to 5	86.5		
S0028R	6,348,973	2,072,585	261.2	0 to 10	165.0	✓	
S0029R	6,350,083	2,070,526	260.1	0 to 5	125.0		✓
S0030R	6,350,741	2,067,265	258.0	0 to 5	101.5		
S0031R	6,356,336	2,061,961	260.0	0 to 5	81.5		
S0033AR	6,358,797	2,060,298	260.5	0 to 5	101.5		
S0034BR	6,365,001	2,056,443	260.4	0 to 5	100.8		
S0065R	6,405,123	1,905,926	193.8	0 to 5	101.5		
S0066R	6,406,042	1,904,337	193.9	0 to 5	101.5		
S0067R	6,407,179	1,902,052	194.1	0 to 5	165.0	✓	
S0068R	6,409,398	1,898,743	198.2	0 to 5	151.5		✓
S0069AR	6,419,517	1,881,494	189.3	0 to 5	101.5		
S0069R	6,416,169	1,887,197	191.9	0 to 5	101.4		
S0070R	6,429,740	1,864,081	194.4	0 to 5	101.3		
S0071R	6,435,478	1,854,182	192.2	0 to 5	151.5		✓
S0072R	6,437,979	1,849,931	196.0	0 to 5	165.0	✓	✓
S0073R	6,440,362	1,845,859	213.0	0 to 5	81.5		

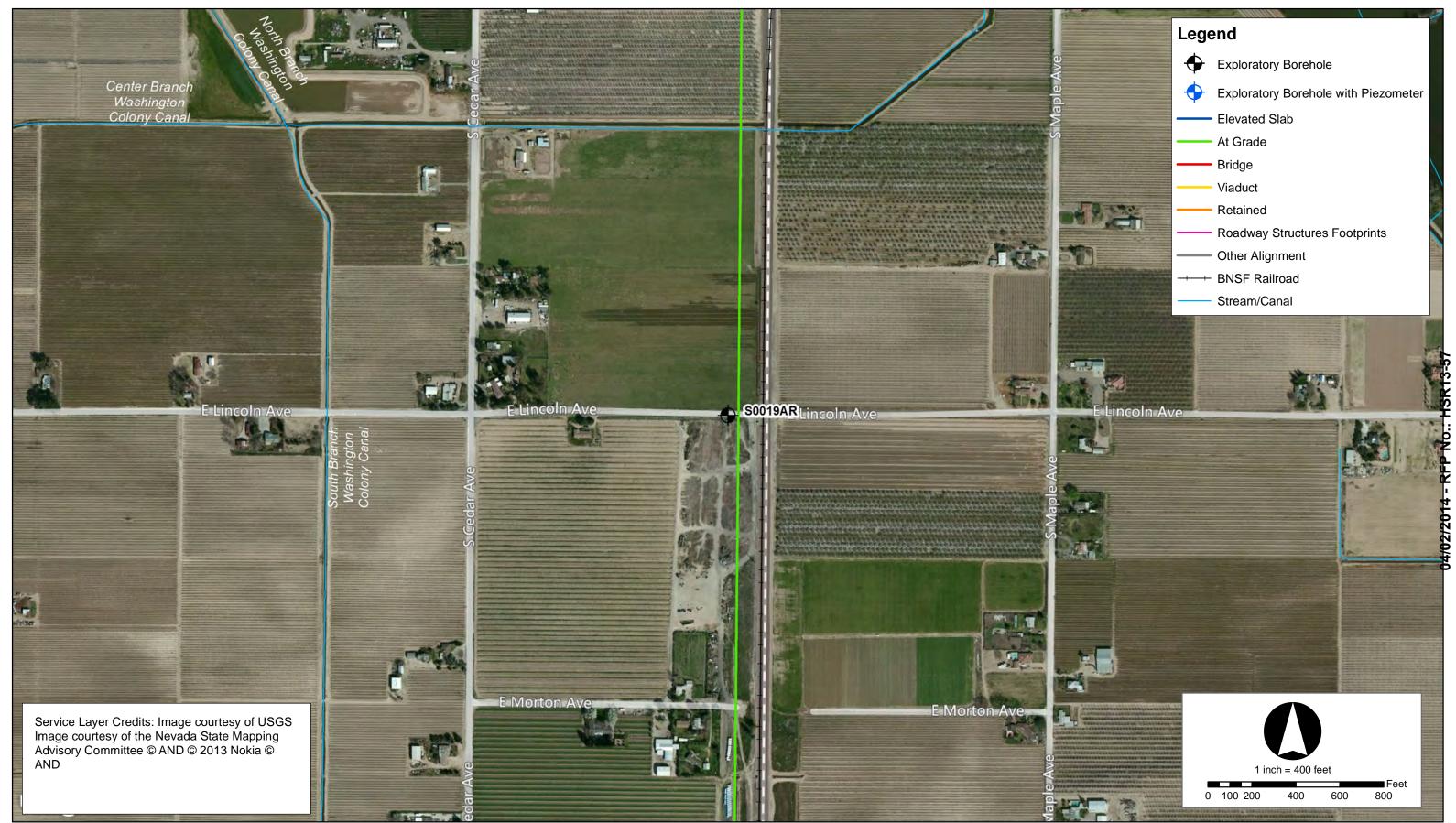
<sup>[1]</sup> PS = P- and S-wave suspension velocity logging

<sup>[2]</sup> PZ = Standpipe Piezometer



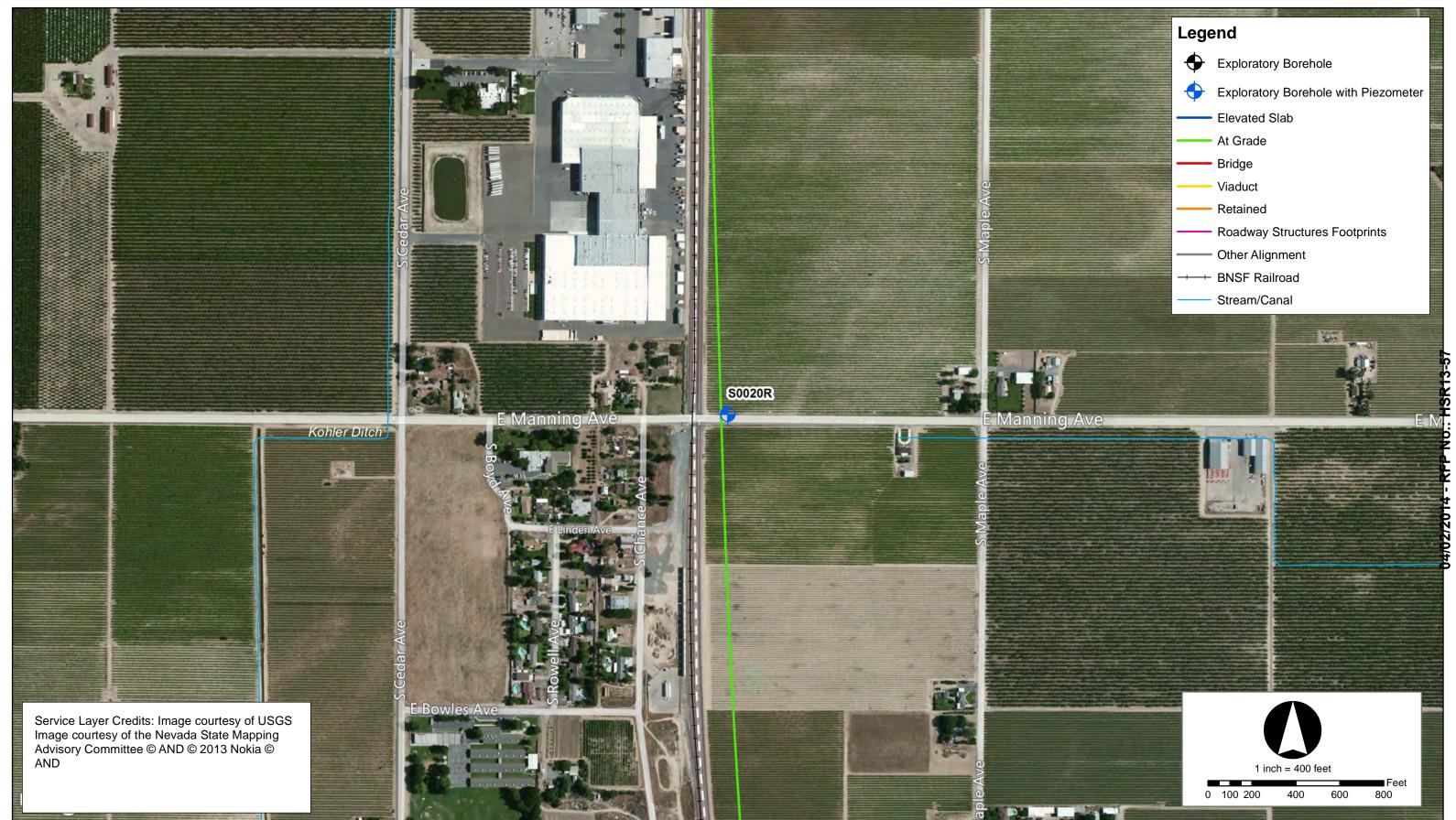






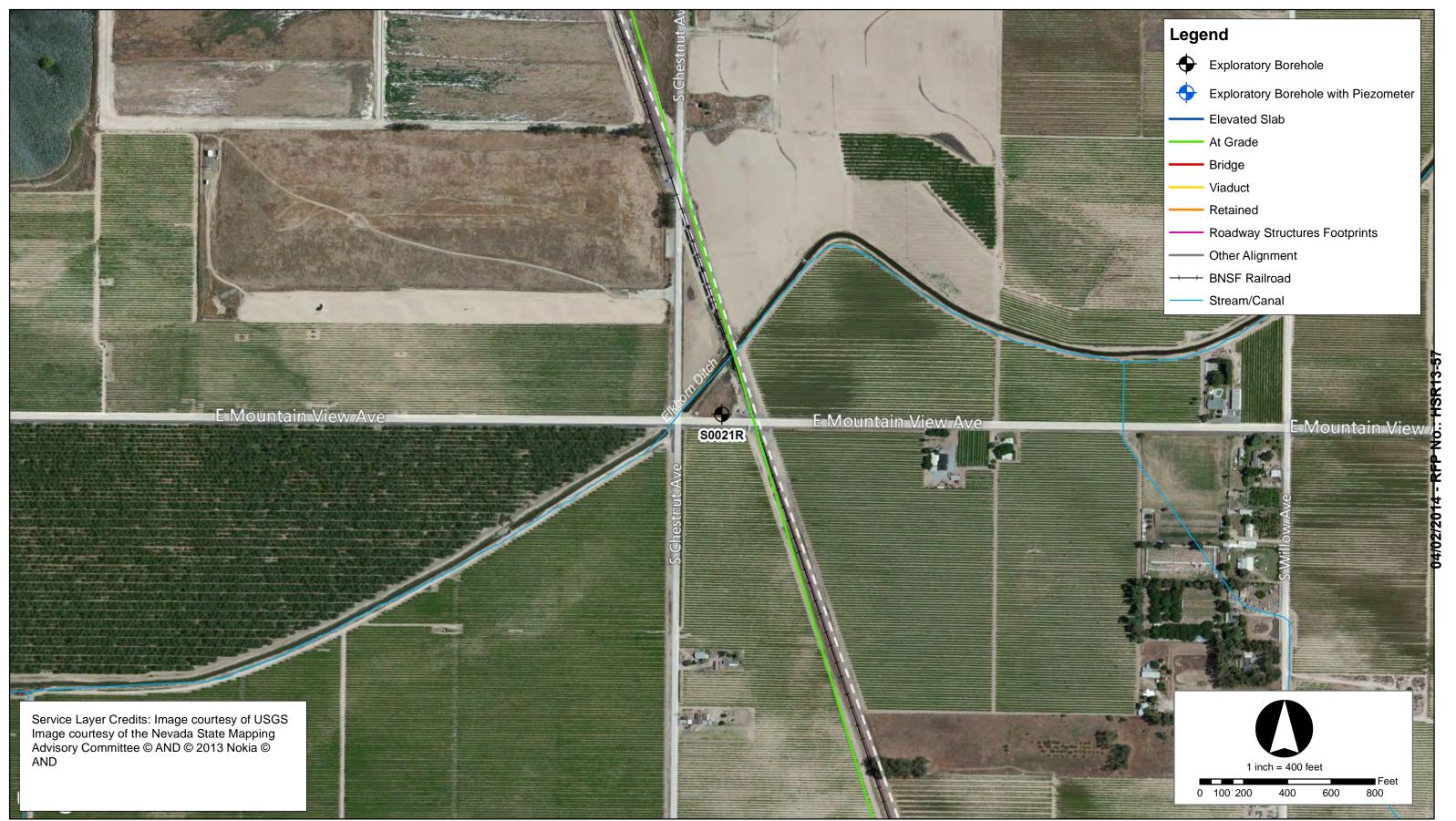






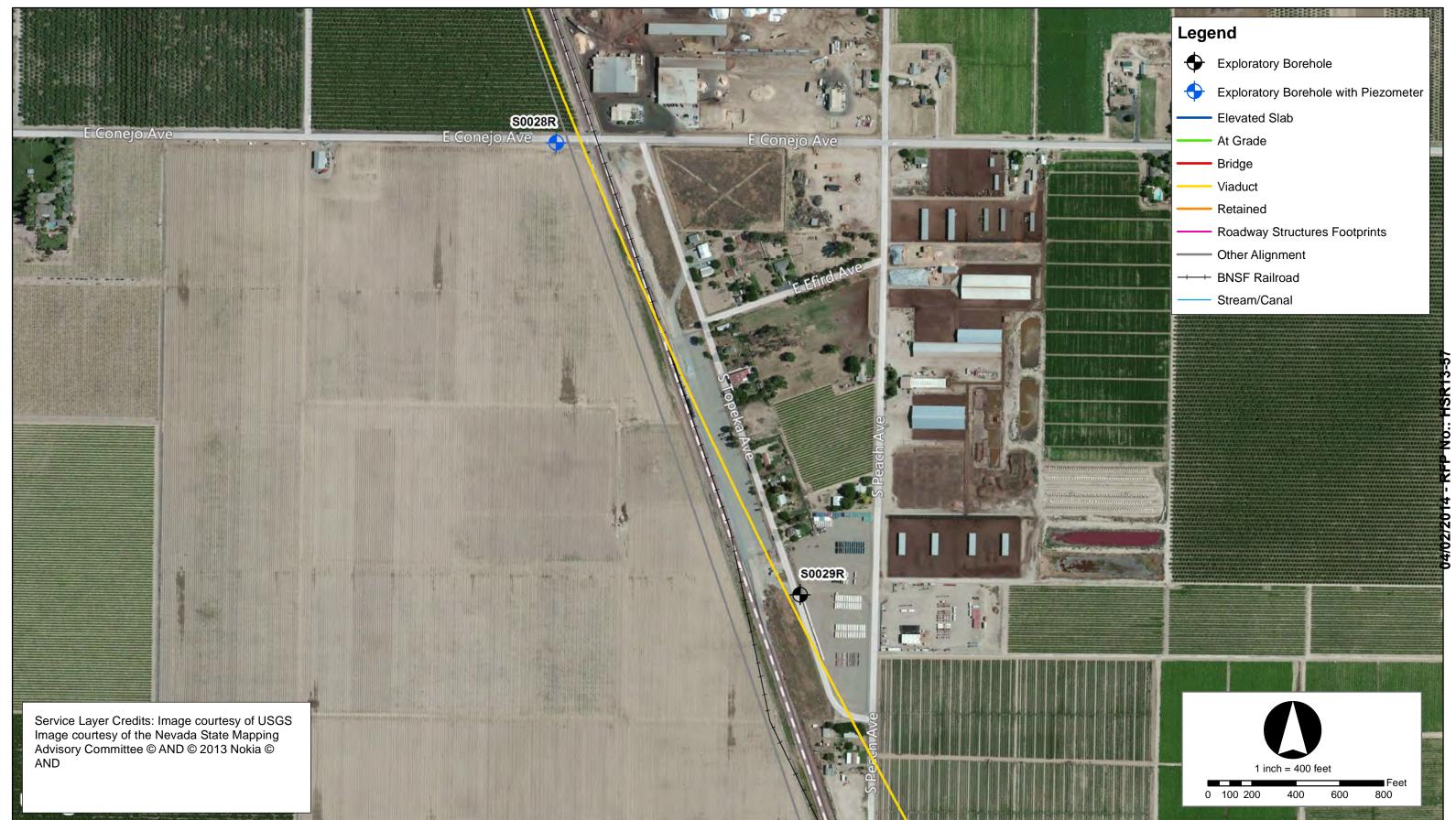






















































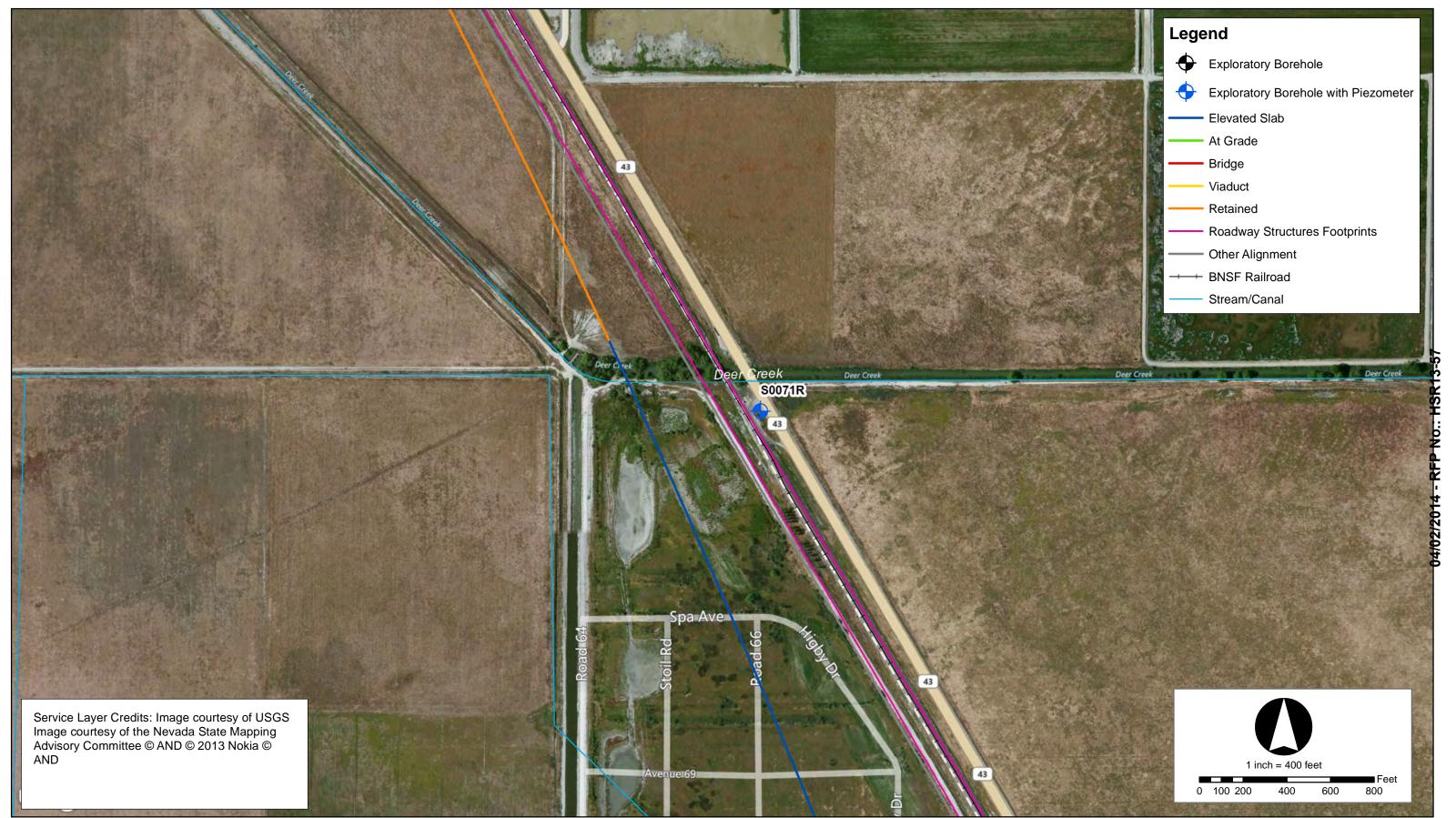






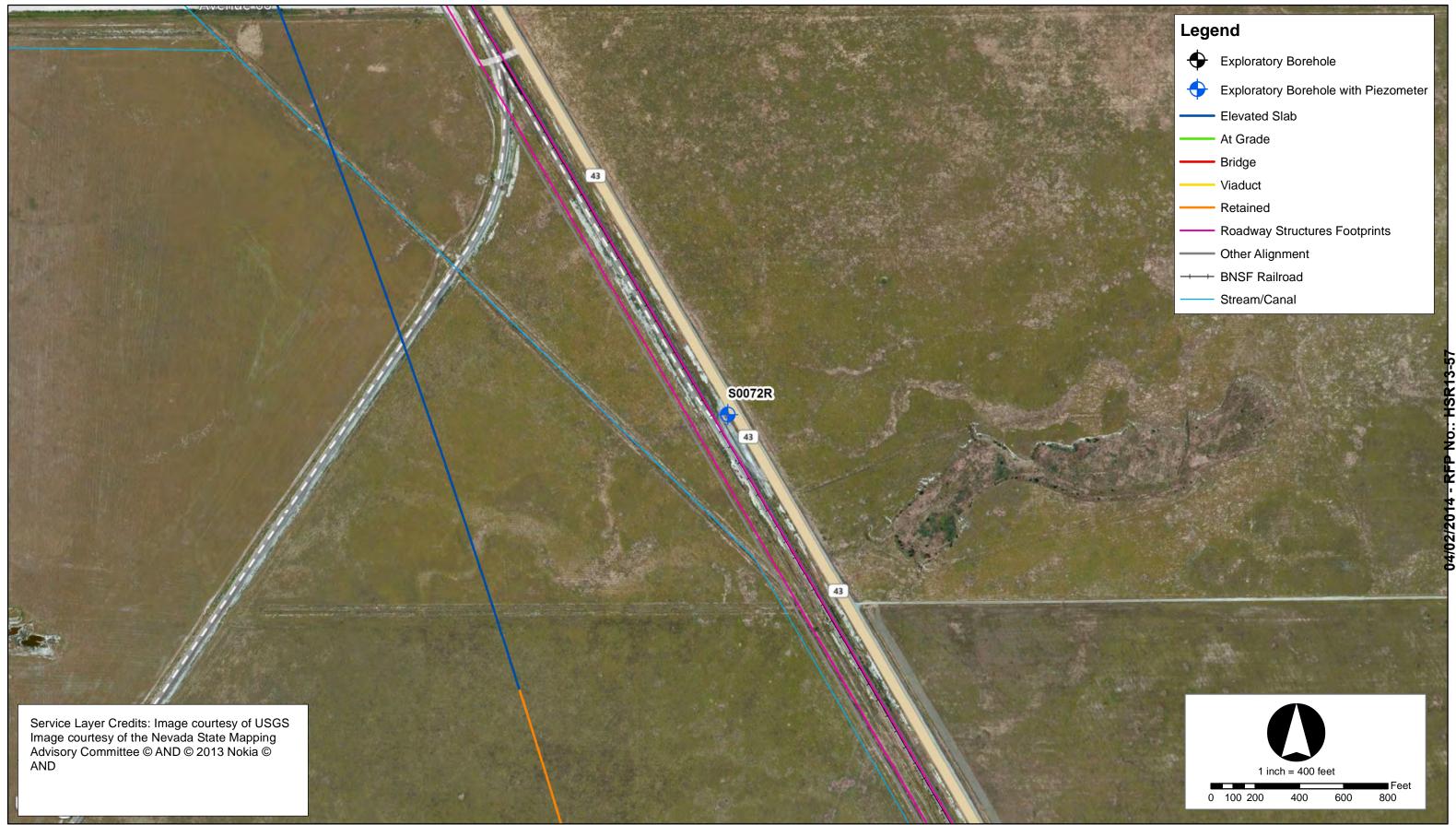






















LOGG	<b>ornia</b> ED BY	High	n-Speed Train Frest BEGIN DATE	COMPLETION DATE					ATION (L									1	<b>13157</b> OLE II		
Greg	NG Co	ONTRA	Aug-19-13 ACTOR/DRILLER E. Santellan	Aug-20-13	IN-SIT	U T	EST		6 / E634	141	2.25	4 (N	NAD	83 C	CA Z	4)		SI 2	JRFA 287.8	19AR CE ELEVATION 9 ft (NAVD88)	
ORILLI AUG			D ROTARY(5'-81.5')		DRILL M-10														OREH 1-7/8	OLE DIAMETER in	
MC(2	2-1/2' HOLE	'), SP BACK	) AND SIZE(S) (ID) 'T(1-3/8") FILL AND COMPLETION out	N		ma IND	atic, WA	140	lbs, 30	G DF	RILLIN	-		ER D				{ E) T(	35%	R EFFICIENCY, ER  DEPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics	D	escription		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/	
				escription			3	60	ш	2		<u> </u>	8		V					Hand auger first 5°; n Bulk sample taken	
82.89	5   1   1   1   1   1   1   1   1   1		- loose; moist; some S		· — — —		MC- 01	5 6.5	5-6-8	14	18	13		112.4	7.2					DS	-
77.89	10		SANDY SILT (ML); ver and reddish brown; mo cementation; [NATIVE]		own		SS- 02	10	14-15-10	25	18	7	59.4								
72.89	15		Poorly graded SAND ( brown and reddish bro SAND.	SP); medium dense; mott wn; moist; fine to mediun	tled																
			Poorly graded SAND ( brown; moist; medium	SP); dense; dark yellowis grading to fine SAND.	.— — — h		MC- 03	16.5	7-13-30	43	18	14	3.6	112.4	7.2				<u> </u>	DS	
67.89	20																				-
			(continue	d)				F	REPORT	TITL	.E									HOLE ID	
								E	BORING DIST.	G R				ROUT	Έ	PO	OSTM	1ILE		S0019AR EA	
7	H	CA ligh-	LIFORNIA Speed Rail Author	IRS HMM A	ARLIP	MAPI			PROJECT Californ BRIDGE N	ia H	igh-	Spe	REF		D BY				DA 1-2	TE SHEET 27-14 1 of 5	

Calif	ECT N	ı High	n-Speed Train Fres	no to Bakersfield	BODE	ш		000	TION /	ot/l o	22.0	. Non	th/⊏a	not on	d Do	t\		1	3157		
M. V	ED BY Valke	ſ	BEGIN DATE Aug-19-13	COMPLETION DATE Aug-20-13	N212	201	192	.055	TION (L / E634									5		9AR	
Greg	gg Dri	lling/E	ACTOR/DRILLER E. Santellan		IN-SIT			ΓING										2	287.89	DE ELEVATION Oft (NAVD88)	
	ING M SER(0		D ROTARY(5'-81.5')		DRILL M-10			.)										- 1	экенс 1-7/8 i	OLE DIAMETER n	
			i) AND SIZE(S) (ID)		SPT H				PE Ibs, 30	)_inc	h dr	nn.							AMMER 35%	R EFFICIENCY, ERI	
BORE	HOLE	BACK	T(1-3/8") FILL AND COMPLETIO	N	GROU	IND	WA					-	AFT	ER D	RILL	NG (	DATE	1 '		DEPTH OF BORING	;
Neat	ceme	ent gr	out		READI	NG	iS		Not Re	cord	ded		1	Not F		rded	ı	8	1.5 ft		
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	_
			SILTY SAND (SM); ve grayish brown; moist; moderate cementation	ery dense; mottled brown v some fines; fine SAND; n.	vith	X	SS- 04	20 21.42	12-23- 50/5"	73/ 11"	17	12.5							STREETSTREETS		
62.89	25		- medium dense; light	yellowish brown; micaceo	ous.														000000000000000000000000000000000000	23.0', hard drilling	-
						M	MC- 05	25	5-8-9	17	18	14							M		
			Poorly graded SAND	with SILT (SP-SM); mediu		Δ		26.5					29.3	97.2	14.6					COLL	
			dense; dark yellowish SAND.	brown; moist; few fines; fi	ine														MANNAMA		
57.89	30-					X	SS- 06	30	7-12-12	24	18	8.5	7.5		10.2						-
	35		SILTY SAND (SM); m brown with light reddis fine SAND.	edium dense; mottled gra sh brown; moist; some fine	 yish es;																
52.89	35					X	MC- 07	35 36.5	11-16-16	32	18	14	39.2	110.6	11.2						-
			Poorly graded SAND brown; moist; medium	(SP); dense; dark yellowis n grading to fine SAND.	 h																
47.89┕	40		(continue	ed)		_															_
								E	REPORT BORING DIST.	G R				ROUT	E	P	OSTM	IILE		HOLE ID S0019AR EA	
<b>7</b>	H	CA ligh-	LIFORNIA Speed Rail Autho	rity CALEDWAR HO	ARLIP M-SPARE TH	A.P.	1		ROJECT Californ RIDGE I	ia H	igh-	Spe	ed PREF		D BY				DAT 1-2	TE SHEET 27-14 2 of 5	

	ECT NA <b>fornia</b> ED BY		<b>-Speed Train Fre</b> BEGIN DATE	sno to Bakersfield COMPLETION DATE	BORE	HO	LE L	_OCA	TION (L	at/Lo	ng oi	r Nort	th/Ea	ist an	d Da	tum)		1	OJEC <b>3157</b> DLE ID		_
M. V	Valker	ONTRA	Aug-19-13 ACTOR/DRILLER  Santellan	Aug-20-13		20	192.	.055	/ E634									SL	JRFAC	9AR CE ELEVATION 9 ft (NAVD88)	
DRILL	ING ME	ETHO			DRILL M-1			١.										BC	REH	OLE DIAMETER	
SAMPI MC(2 BORE	LER T\ 2-1/2"	YPE(S '), SP BACKI	) AND SIZE(S) (ID) T(1-3/8") FILL AND COMPLETION	ON	SPT F	HAN Oma	MEF atic,	7 TYI 140	lbs, 30	G DF	RILLIN	-		ER D	Reco		•	HA 8	5%	R EFFICIENCY, ERI	
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	40			·		Ĭ	SS- 08	40	12-15-17					96.3				•	0		_
242.89	45		- grayish brown; fine	to medium SAND.			MC- 09	45 46.5	16-25-25	50	18	13	4.5	108.3					<u>0000000000000000000000000000000000000</u>		
237.89	50		- fine to coarse SAN	D.			SS- 10	51.5	10-15-16	31	18	7.5							$\sim$		
232.89	55						MC- 11	55	15-24-29	53	18	11									
			SILTY SAND (SM); v fine SAND; weak cer	very dense; grayish brown mentation.	; moist;			56.5											000000000000000000000000000000000000000		
227.89┕	60	.c.fll	(continu	ued)																	
								E	EPORT BORING IST.	3 R	E ECC OUNT			ROUT	E	P	OSTM	IILE		HOLE ID S0019AR EA	
	Н	CAI	LIFORNIA Speed Rail Auth	ority Caroner	ARLIP 4GH - SIMILIP TI	Trans.			ROJECT Californ RIDGE N	ia H	igh-	Spe	ed REF	IE Trair PARE lagg	D BY				DAT 1-2	TE SHEET 27-14 3 of 5	

Califor LOGGED M. Wa	D BY	g <b>h-Speed Train Fresn</b> BEGIN DATE Aug-19-13	o to Bakersfield COMPLETION DATE Aug-20-13	BOREI N212				ΓΙΟΝ (L. ' E634									<b>1</b>	<b>3157</b> DLE ID	
DRILLING Gregg	G CONT Drilling	RACTOR/DRILLER /E. Santellan	7.03 20 10	IN-SITU	U TE						. (.				.,		SL 2	JRFAC 87.89	E ELEVATION Oft (NAVD88)
AUGEI SAMPLE MC(2- BOREHO	R TYPE( 1/2"), S	, ROTARY(5'-81.5') (S) AND SIZE(S) (ID) PT(1-3/8") KFILL AND COMPLETION			) (D4 AMM mati	ER 1 c, 1	40 I	lbs, 30	G DF	RILLIN	-			RILLI			4 HA 8	-7/8 i AMMEF 85%	R EFFICIENCY, ERI
Elevation (ft)	Depth (ft) Material Graphics	De	escription		Sample Location	Sample Depth (#)	Sample Deptil (it)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
60	0		·		Si	S- 6	0 2	27-43-41		18	_	23.4	_			1		000000000000000000000000000000000000000	
22.89 65	5	- medium dense.  Poorly graded SAND wigrayish brown; moist; fi	ith SILT (SP-SM); dense ne to medium SAND.	 ;	M 1			32-22-15	37	18	16		112.2	13.7		NP		STATATATATATATATATATATATATATATATATATATA	
17.89 70					s:1	4	0 1	12-19-18	37	18	13.5	12.6							
12.89 75	5—	SILT (ML); medium stiff increasing cementation cemented.	f; dark yellowish brown; r from none to moderatel	moist; y	M' 1			11-23-43	66	18	18		87.1	32.1 32.0		NP		<u> </u>	Recovery not noted on logs PP: 2.5, 2.5, 2.25 tsf TV: 0.275, 0.20 tsf DS
07.89 <b>—</b> 80		SILTY SAND (SM); den reddish brown; moist; n	nedium SAND.																
		(continued	<del>'</del>				RE	PORT	TITL	.E _									HOLE ID
	CA	LIFORNIA -Speed Rail Author	URS HMM	ARLIP			DIS	ORING ST. ROJECT aliforn	CC	BRII	Y	NAM			PO	OSTM	IILE		S0019AR EA

	ECT N/ fornia		h Chaad	Trois 5	roome	to D-	akorof	Fiold																CT NUM 77 00	IDEK	
			<b>h-Speed</b> BE			COMPI	AKETST LETION	N DATE					ATION (L									H	315 DLE II	<b>77-00</b> D		
M. V	Valker	•	Aı	ug-19-1			20-13		N21	20	192.	.055	/ E634									S	003	19AR		
			ACTOR/D						IN-SIT	U T	EST	ING										- 1			VATION	
	JY DIII		E. Santel	iai i					DRILL	Ρlí												_			AVD88) AMETER	
			ROTAR'	Y(5'-81.	5')				M-10			)											-7/8		AIVIL I LIX	
			S) AND SIZ						SPT H	· IAN	1MEF	R TY										_			CIENCY, EI	Ri
MC(	2-1/2"	), SP	PT(1-3/8"	)									) lbs, 30			-							35%			
			FILL AND	COMPLE	ETION		-		GROL READ			TER	DURING			IG									OF BORIN	١G
Neat	ceme	ent gr	out						INLAD	IIVC			Not Re	cord	led			Not F	Reco	rded		8	1.5 f	t		
Elevation (ft)	© Depth (ft)	Material Graphics			Des	scriptior	n			Sample Location	Sample Number	Sample Depth (ft)	.i. 6 Swo Blows Der 6 16-21-26	N-Value (bl/ft)	Benetration (in)	⇔ Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Market Drilling Method		Remarks/ Other Tests ery not noted	s
			Borehol	e termina	ited at a	depth	of 81.5	' on 8/20	/2013.	<i>/</i> \		81.5														
	85		became drilling f used as	sture indi wet durin luid. Soil a definiti or free gr	ng retrie moistui ve indic	eval thro ire indic ation of	ough ro cation s f a pote	tary met should no	hod ot be																	
02.89				ehole Log to test da				sification	chart																	
	=																									•
97.89	90																									
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2.89	95—																									
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												1-	DEDOO:	T1T1	г									11101	- ID	
													REPORT B <b>ORIN</b> (			RD	)								LE ID 019AR	
													DIST.		UNT			ROUT	Έ	PC	DSTM	IILE		EA		
( )	20	Δ	LIFO	RNI	A	{	LIR	S HMM	ARLIP			F	PROJECT	OR	BRID	OGE	NAM	ΙE								
			Speed I				T	SAL STREET	mini				Californ	ia H	igh-	Spe	ed	Trair					1-			
		·9·11	opecu i	tuli MU	MOIN	7			The same of the				BRIDGE N	NUME	3EK		KEP O. M	are lagg	D BY ii				DA 1-	TE 27-14	SHEET 5 of	5
												_						33								-

	ECT N		s Spood Train Frospo	to Bakorefield																T NUMBER 77-00	
	ED BY	пıyı	n-Speed Train Fresno BEGIN DATE						TION (L									HC	LE I	)	
NG DRILL	ING CO	NTR.	Aug-20-13 ACTOR/DRILLER	Aug-21-13	IN21				/ E634	158	3.03	(IV	AD8	3 C/	4	)				20R CE ELEVATION	
Greg	gg Dril	ling/E	E. Santellan															- 1		1 ft (NAVD88)	
	ING ME		D MUD ROTARY(5'-101.	5')	DRILL M-1			١											REH .0 in	OLE DIAMETER	
			) AND SIZE(S) (ID)	,	SPT F	· IAN	ИМЕ	R TYI												R EFFICIENCY, ER	Ri
			T(1-3/8")						lbs, 30							NO /		- 1	5%	DEDTIL OF DODIN	
	HOLE omete		FILL AND COMPLETION		READ				DURING Not Re			NG				rded	JATE	1	01.5	DEPTH OF BORIN	G
																	<u>(6</u>	,			
(ft)		Material Graphics				Sample Location	Sample Number	Sample Depth (ft)		bl/ft)	Penetration (in)	(in)	(%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	f)	Drilling Method		
Elevation (ft)	Depth (ft)	erial (				ple L	n eld	ple D	Blows per 6 in.	N-Value (bl/ft)	etratic	Recovery (in)	200 Wash (%)	Densi	ture (	id Lin	ticity	TXUU (psf)	Drilling Metho	<u> </u>	
Ele	Оер	Mate	Des	cription		Sam	Sam	Sam	Blow	>-\ N	Pen	Rec	200	Dry	Mois	Liqu	Plas	TXU	Drilli	Remarks/ Other Tests	
			Poorly graded SAND with dense; brown to dark brown	wn; dry; some SAND; li	ittle	500	B- 01	0			24	24							}	Hand augered to 5'	
	∃		GRAVEL; trace fines; sub SAND; subangular to ang	orounded to subangula gular GRAVEL; [FILL].	r	500													{{		∄
	=		Poorly graded SAND (SP	): loose: brown: drv: m		5000	B-	2			36	36									∃
	₫		SAND; trace fines; mediu to subrounded; [NATIVE]	ım to fine SAND; subar	ngular	000	02														∄
	$\exists$		1			000															=
	$\equiv$					000													{{		3
273.21	5		- medium dense; moist; r	months SAND: fine SAN	D.	224	SS-	5 5	4-4-6	10	18	8							K		∄
	$\exists$		rounded to subrounded; v	weak cementation.	D,	$\parallel$	03	5	4-4-0	10	10										=
	$\equiv$					X		6.5												Cooree areval lever	
	$\exists$		Poorly graded SAND with	SILT (SD SM); modiu		-														Coarse gravel layer somewhere between and 10'	n 6.5
	Ξ		dense; light brown to brown		111																∄
	$\exists$																				
																					⋾
268.21	10-					Т	MC-	10	5-12-14	26	18	8.5								Sample #2 about 1/2	2 full
	$\exists$						04						11.0	100.0						of gravel	₫
	$\exists$							11.5					14.2	106.2	6.3					DS	3
5	=		- = = = = = = = = =																		
	∃		SILTY SAND (SM); loose streaks; moist; fine SAND																		∃
	∄																				$\equiv$
	∃																				Ξ
263.21	15					T	SS- 05	15	3-4-5	9	18	7.5								Coarse gravel sloug	hing
	∃					$\bigvee$		16.5					26.1		7.6						∃
	₫							10.5													∃
	$\exists$																				Ξ
	=																		<u> </u>		
	=																				∄
250 21	20																				$\exists$
258.21 2	20		(continued)																		
									EPORT			)RC	)							HOLE ID S0020R	
									IST.		UNT			ROUT	E	PC	STM	IILE		EA	
203.21 268.21 26	)(	A	LIFORNIA	LIRS HMM A	VRUP .				ROJECT												
K (	Н	igh-	Speed Rail Authorit	CALEDNA HO	H-SHIDT	VAPV			Californ RIDGE N			ŤΕ	PREF	ARE	D BY				DA		-
<u> </u>									•			[	D. N	lagg	ji					27-14 1 of 6	3

	ECT NAM <b>fornia h</b> EED BY			Train Fre SIN DATE Ig-20-13		Bakersfield IPLETION DATE g-21-13					TION ( / E634									<b>1</b>	3157 DLE ID 3002	)
RILLI		ng/E.	CTOR/D . Santell	RILLER	, 100	<u> </u>	IN-SIT	U T	EST					γ. σ		- 51		,		SL 2	JRFAC 178.21	CE ELEVATION  1 ft (NAVD88)  OLE DIAMETER
AUG	SER(0'-5	5'), N	NUD RC	TARY(5'-	101.5')		M-1			.)											7.0 in	OLE DIAIVIETEK
			AND SIZ				SPT F				PE Ibs, 3	) inc	h dr	on							AMMER 85%	R EFFICIENCY, ERI
			Γ(1-3/8") FILL AND	) COMPLETI	ON									•	AFT	ER D	RILLI	NG (	DATE	- 1		DEPTH OF BORING
Piezo	ometer						READ				Not R					Not F				1	01.5	
		<b>"</b>															(%)		(%			
Elevation (ft)	Depth (ft)	Material Graphics			Descript			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
	20			n dense; yel e to weak ce		own; little fines; on.		$\coprod$	MC- 06	20	6-12-19	31	18	11							MANN	Gravel sloughing into he from above
53.21	25—		- dark ve	llowish brov	vn: trace t	fines; fine SANE c cementation.	);	X	SS- 07	25 26.5	7-11-21	32	18	11	27	90.2	19.3					DS  Gravel sloughing into h
48.21	30		grayish b	raded SANE prown; mois ded; slightly	t; mostly t	edium dense; br fine SAND; roun us.	own to ded to	X	MC- 08	30 31.5	11-15-1	3 33	18	17.5	_							Hard drilling; kept sam #1 and #2
13.21	35		SILT (MI plasticity	_); very stiff; r, slow dilata	grayish b	orown; moist; lov toughness.	v		SS- 09	35	9-13-10	23	18	9	90.7			24.1	3.1		<u> </u>	
			grayish to SAND; to subround CLAY with orangish	prown with or ace fines; n ded; low tou th SAND (C	orangish b nedium S ghness; I L-ML): ha aks; medi	ry dense; varieg prown; moist; mc AND; subangula ayered with SIL ard; grayish brow ium plasticity; no	ostly ar to FY vn with	X	MC- 10	37	9-23-31	54	18	18								
38.21┕	40			(contin	ued)								1								لكا	ı
										E	REPORT BORIN DIST.	G R				ROUT	E	PC	OSTM	ILE		HOLE ID S0020R EA
	C	AL gh-S	IFO peed F	RNIA	ority	LRS HMM	ARUP	DAP		(	ROJEC Californ RIDGE	nia H	ligh-	Spe F	ed PREF		D BY				DAT 1-2	SHEET 27-14 2 of 6

Calif	ECT N <b>fornia</b> ED BY	ı High	n-Speed Train Fres BEGIN DATE	no to Bakersfield COMPLETION DATE	BOREH	IOI	FIG	OCA	TION (L	at/Lo	na o	· Nor	th/Fa	ıst an	d Dat	tum)		1	3157 OLE ID	
NG			Aug-20-13	Aug-21-13	N210	437	78.6	614	/ E634									S	3002	
Greg	gg Dri	lling/E	. Santellan		IN-SITU			ING										2	78.2	1 ft (NAVD88)
	ING M SER(0		D MUD ROTARY(5'-1)	01.5')	DRILL F M-10														OREHO '.0 in	OLE DIAMETER
SAMPI	LER T	YPE(S	) AND SIZE(S) (ID)	·	SPT HA	MM	ÆR	TYF	PE Ibs, 30	-inc	h dr	าก						HA		R EFFICIENCY, ERI
			T(1-3/8") FILL AND COMPLETIO	N	GROUN	NDV	VAT					•	AFT	ER D	RILLI	NG (	DATE			DEPTH OF BORING
Piezo	omete	er			READIN	IGS	3 		Not Re	cord	ded		١	Not F		rded	<b>!</b>	1	01.5	ft 
Elevation (ft)	Depth (ft)	Material Graphics		Description	C il second		_	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
			reddish brown streaks SILT (ML); hard; grayi:	sh brown variegated with AND; low plasticity; low dry	, <u>/</u>		11	40 41.5	9-15-20	35	18	12	89.3							
33.21	45		Poorly graded SAND (	ncrease SAND content.  (SP); very dense; brown to mostly SAND; trace fines;			12	45 46.5	12-18-26	44	18	15	72.6	102.6	19.7				<u> </u>	
28.21	50-		medium SAND.  SILTY SAND (SM); ve	ry dense; brown; moist; so	me		13	50	15-25- 50/5"	75/ 11"	17	12							$\sim$	Rapid dilatancy; pock of dry sand
			SILT with SAND (ML);	k cementation in last 4".  hard; grayish brown; mois h pockets of fine SAND.	st;														000000000000000000000000000000000000000	
23.21	55				-		14	55 6.42	22-37- 50/5"	87/ 11"	17	0	77.2	103.1	16.6					Pockets of dry sand (\$ to SM)
18.21	-60			SP); very dense; light gray SAND; trace fines; fine to	ish															
			(continue	ed)																
								Е	EPORT BORING IST.	3 R				ROUT	E	P	OSTM	IILE		HOLE ID S0020R EA
	H	CA ligh-	LIFORNIA Speed Rail Autho	rity CALEDWA HO	RLIP SHALL THAI	<b>N</b>			ROJECT Californ RIDGE N	ia H	igh-	Spe   F	ed REP	IE Trair PARE lagg	D BY				DA1	TE SHEET 27-14 3 of 6

	ECT N <b>fornia</b> ED BY		n-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DAT	E BORE	HO	LE I	OC/	ATION (L	at/Lo	na o	Nor	th/Ea	ast an	ıd Dat	um)		1	ROJEC <b>3157</b> DLE IE		BER
NG			Aug-20-13 Aug-21-13	N21	043	378	.614	/ E634									S	3002	20R	
			ACTOR/DRILLER E. Santellan	IN-SI	TU T	ES	ΓING	i									1		CE ELE\ 1 ft (NA	/ATION AVD88)
RILLI	ING M	ETHO	D	DRILL			`										BC	DREH	•	METER
			MUD ROTARY(5'-101.5')  ) AND SIZE(S) (ID)	M-1 SPT I			•	PE									_	'.0 in AMME	R EFFIC	CIENCY, ERI
MC(2	2-1/2'	'), SP	T(1-3/8")					) lbs, 30									1	35%		
	omete		FILL AND COMPLETION	READ			IER	Not Re			NG			RILLI Recoi			. 1	01.5		OF BORING
														(%)		(%)	•			
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		Remarks/ Other Tests
	65				X	SS- 15	61.5	20-26-31	57	18	8							<u> </u>	Mixed r	nore drilling mud
13.21	65		- dense; brown to grayish brown; medium SA rounded to subrounded; micaceous.	AND;	X	MC- 16	65 66.5	17-25-27	52	18	18	2.9	100.6	6.9					Muscov size	vite, medium gra
08.21	70		Poorly graded SAND with SILT (SP-SM); den grayish brown; moist; medium to fine SAND; micaceous.			SS- 17	70 71.5	14-24-22	46	18	10	12.2		11.4					Muscov size	rite, medium gra
03.21	75		SILT (ML); hard; dark yellowish brown; moist SAND; micaceous.	;; fine	X	MC- 18	75	23-46-48	94	18	16	88.5	98.7	24.7						
98.21	80		(opptimized)				76.5													
			(continued)				6	REPORT	TITI	.E									HOL	E ID
_							E	BORING DIST.	3 RI				ROUT	E	PC	OSTM	ILE			)20R
		CA	LIFORNIA Speed Rail Authority	ARLIP			F	ROJECT Californ	OR ia H	BRII	OGE Sne	NAN	IE Trair	า	1					
	H	ligh-	Speed Rail Authority	HGH-SHID T	TPAPY			BRIDGE 1					PARE					DA	r=	SHEET

Cali LOGG	<b>fornia</b> SED BY	Hig	h-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE	BORF	HOI	ΕI	OC/	ATION (La	at/l ∩	na oi	· Nor	th/F:	ast an	ıd Dat	um)		1:		77-00	4
NG			Aug-20-13 Aug-21-13	N21	043	78.	614	/ E634									S	002	20R	
			RACTOR/DRILLER E. Santellan	IN-SIT	UT	EST	ΓING												CE ELEVATION 1 ft (NAVD88)	
	ING M		DD MUD ROTARY(5'-101.5')	DRILL M-10			`										BC	REH	OLE DIAMETER	
			S) AND SIZE(S) (ID)	SPT H	•		•	PE										.0 in .MME	R EFFICIENCY, ERI	$\dashv$
MC(	2-1/2	'), SF	PT(1-3/8")	1				) lbs, 30			-			<b></b>				5%	DEDTIL OF DODING	
	omete		(FILL AND COMPLETION	READ			IEK	DURING Not Re			NG			Recoi		JATE	1	01.5	DEPTH OF BORING ft	
Elevation (ft)	Depth (ft)	Material Graphics	Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		
193.21	85		Poorly graded SAND (SP); very dense; grayish brown; wet; mostly SAND; trace fines; medium to SAND; rounded to subrounded.  SANDY SILT (ML); hard; grayish brown; moist; loughness.  SILTY SAND (SM); very dense; brown; wet; som SAND; little fines; rounded to subrounded.	low		SS- 19	80 81.5	13-33-32 37-35-24		18	12	55.6						000000000000000000000000000000000000000	7.5" from bottom is a change from sand to silt low toughness	3-57
# 1771 # 1771 # 1771 # 188.21	90		SILT with SAND (ML); hard; variegated grayish I with frequent gray streaks; moist; fine SAND; low plasticity; low dry strength; low to high toughnes strong cementation; frequent strong cement noc	w s;	H	20	86.5													4 - RFP No.: HSR1
188.21	95		- SILT (); grayish brown mottled with reddish bro	own:	X	SS- 21 MC-	90 91.5	35-57-	107/	18	18								Possible calcite streaks at 90.9'	04/02/201
2			trace SAND; rapid dilatancy; moderate cementa		M	22	96.25	50/3"	9"			96.3	101.5	23.4				000000000000000000000000000000000000000	PP: >5.0, 2.5, 2.0 tsf TV: 0.23 tsf	
2	100		(continued)																	
								REPORT BORING			ORD	)							HOLE ID S0020R	
4								DIST.		UNT			ROUT	Έ	PC	STM	IILE		EA	
	H	CA ligh-	LIFORNIA Speed Rail Authority	ARLIP M-SHAD TO	TARY		(	PROJECT Californ BRIDGE N	ia H	igh-	Spe F	PREF	Trair	D BY	-			DA 1-2	TE SHEET 27-14 5 of 6	

Gregg Drilling/E. Santellan         278.21           DRILLING METHOD         DRILL RIG           AUGER(0'-5'), MUD ROTARY(5'-101.5')         M-10 (D44)         7.0 in           SAMPLER TYPE(S) AND SIZE(S) (ID)         SPT HAMMER TYPE         HAMMER           MC(2-1/2"), SPT(1-3/8")         Automatic, 140 lbs, 30-inch drop         85%	
DRILLING CONTRACTOR/DRILLER Gregg Drilling/E. Santellan  DRILLING METHOD AUGER(0'-5'), MUD ROTARY(5'-101.5')  SAMPLER TYPE(s) AND SIZE(s) (ID) MC(2-1/2"), SPT(1-3/8")  BOREHOLE BACKFILL AND COMPLETION Piezometer  Description  Description  DRILL RIG M-10 (D44)  SPT HAMMER TYPE Automatic, 140 lbs, 30-inch drop READINGS Not Recorded Not Recorde	ELEVATION IT (NAVD88) IE DIAMETER EFFICIENCY, ERI EPTH OF BORING Remarks/
Gregg Drilling/E. Santellan  DRILL RIG AUGER(0'-5'), MUD ROTARY(5'-101.5')  SAMPLER TYPE(S) AND SIZE(S) (ID) MC(2-1/2"), SPT(1-3/8")  BOREHOLE BACKFILL AND COMPLETION Piezometer  Order of Market Counter (%)  Description  Description  Description  DRILL RIG M-10 (D44)  SPT HAMMER TYPE Automatic, 140 lbs, 30-inch drop  GROUNDWATER DURING DRILLING AFTER DRILLING (DATE)  TOTAL D  Order of Market Counter (%)  Not Recorded  Not Recorded  Not Recorded  Not Recorded  Order of Market Counter (%)  Order of Market	t (NAVD88) E DIAMETER EFFICIENCY, ERI EPTH OF BORING Remarks/
DRILLING METHOD AUGER(0'-5'), MUD ROTARY(5'-101.5')  SAMPLER TYPE(S) AND SIZE(S) (ID)  MC(2-1/2"), SPT(1-3/8")  BOREHOLE BACKFILL AND COMPLETION Piezometer  (t)  DRILL RIG M-10 (D44)  SPT HAMMER TYPE Automatic, 140 lbs, 30-inch drop  GROUNDWATER DURING DRILLING READINGS Not Recorded Not Rec	E DIAMETER  EFFICIENCY, ERI  EPTH OF BORING  Remarks/
AUGER(0'-5'), MUD ROTARY(5'-101.5')  SAMPLER TYPE(S) AND SIZE(S) (ID)  MC(2-1/2"), SPT(1-3/8")  BOREHOLE BACKFILL AND COMPLETION Piezometer  (t)  Description  Description  AFTER DRILLING (DATE)  Not Recorded  Not	EFFICIENCY, ERI
SAMPLER TYPE(S) AND SIZE(S) (ID)  MC(2-1/2"), SPT(1-3/8")  BOREHOLE BACKFILL AND COMPLETION Piezometer  (t)  Moistnre Coutent (w)  Description  Description  Action (lost)  Description  Description  SPT HAMMER TYPE  Automatic, 140 lbs, 30-inch drop  GROUNDWATER DURING DRILLING  READINGS  Not Recorded  Not Reco	PTH OF BORING  Remarks/
MC(2-1/2"), SPT(1-3/8")  BOREHOLE BACKFILL AND COMPLETION Piezometer  (t)  Work from the properties of	PTH OF BORING  Remarks/
BOREHOLE BACKFILL AND COMPLETION Piezometer  Waterial Graphi (#) Piezometer  Work Recorded  Not Reco	Remarks/
Piezometer    Comparison (#)   Plasticity Index (%)   Plasticity Ind	Remarks/
Company   Comp	
100 - little SAND; fine SAND.	
Borehole terminated at a depth of 101.5' on 8/20/2013.  Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be	
Soli moisture indicated as wet because samples	
used as a definitive indication of a potential phreatic	
surface or free groundwater table.	
73.21 105 —	
See Borehole Log Legend for soil classification chart and key to test data and sampler type.	
4	
168.21 110 =	
168.21 110—	
<u> </u>	
63.21 115-	
<u> </u>	
58.21 120 <del></del>	
REPORT TITLE BORING RECORD	HOLE ID S0020R
DIST. COUNTY ROUTE POSTMILE	EA EA
CALIFORNIA  PROJECT OR BRIDGE NAME California High-Speed Train	
High-Speed Rail Authority BRIDGE NUMBER PREPARED BY DATE	SHEET
D. Maggi 1-27	-14 6 of 6

PROJE <b>Calif</b>	fornia	ı Higl	n-Speed Train Fresno	to Bakersfield														1	3157		BER	
OGGI SV/N		,		COMPLETION DATE Aug-22-13					TION (L / E634										OLE ID 3002			
Greg	gg Dri	lling/E	ACTOR/DRILLER E. Santellan		IN-SIT			ΓING										2	274.17	E ELEV	VD88)	
ORILLI MUD			(0'-86.5')		DRILL M-1			)											ЭКЕНО I-7/8 i	ole dia n	METER	
			AND SIZE(S) (ID)		SPT I				PE Ibs, 30	) inc	h dr	on						HA	AMME		IENCY, ERI	
MC(2 BORE	2-1/2 HOLE	BACK	T(1-3/8") FILL AND COMPLETION									•	AFT	ER D	RILL	ING (	DATE	- 1	35% OTAL I	DEPTH (	OF BORING	<b>.</b>
Neat	ceme	ent gr	out		READ	ING	iS		Not Re	corc	led		1	Not F		rded	ı	8	6.5 ft			
Elevation (ft)	Depth (ft)	Material Graphics		cription		_	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	, O	Remarks/ other Tests	
69.17	5		SILTY SAND (SM); loose SAND; subrounded to sul - medium dense; moist; li	bangular; micaceous [i			B- 01	5 5 6.5	4-7-9	16	18	15	23.3	107.1	4.5				.000000000000000000000000000000000000	COMP,	RV	
64.17	10		SILT with SAND (ML); ve variegated with reddish b				SS- 03	10	6-9-9	18	18	9	80.7	86	20.7				$\sim$			
59.17	15		Poorly graded SAND (SP yellowish brown; moist; fe SAND; rounded to suban micaceous; with thin inter grayish brown variegated SAND; non plastic.	ew fines; fine to mediu gular; flat and elongate rbeds of SILT (ML); ver	m ed; ry stiff;		MC- 04	15	7-9-10	19	18	18										
54.17	20		Poorly graded SAND with dense; yellowish brown; r SAND; rounded to subrou	moist; few fines; mediu	im um			10.5											000000000000000000000000000000000000000			
			(continued)																	1		
								E	EPORT BORING IST.	Ģ RI				ROUT	E	P	OSTM	IILE		S00 EA	EID 121R	
	H	CA ligh-	LIFORNIA Speed Rail Authorit	LIRS HMM	ARLIP BH-SHALD T	TVAPV		C	ROJEC <sup>*</sup> Californ RIDGE I	ia H	igh-	Spe	ed		D BY	<u> </u>			DAT	E 27-14	SHEET 1 of 5	

Calif LOGG			n-Speed Train BEGIN DA								TION (L									<b>1</b> :	<b>3157</b> DLE ID		
Greg	ING CO	ling/E	Aug-21- ACTOR/DRILLEF E. Santellan		Aug-2	۷-13 	IN-SIT	UΤ	EST		/ E634	53/	o.94	(N)	AD8	3 C/	A Z4)			SU 2	74.1	CE ELEVATION 7 ft (NAVD88)	
	ING ME		D (0'-86.5')				DRILL M-10			١										- 1	REH -7/8	OLE DIAMETER	
			) AND SIZE(S) (II	D)			SPT H	IAMI	MEF	RTY										HA	MME	R EFFICIENCY, ERI	
			T(1-3/8") FILL AND COMP	L ETION							lbs, 30				^ <del></del>	-D D	DII 1 1	NO (	DATE		5%	DEPTH OF BORING	
	ceme			LETION	ı		READ			IEK	Not Re			IG		lot F					6.5 ft		ı
Elevation (ft)	O Depth (ft)	Material Graphics		De	escription			_	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
								X	SS- 05	20	6-10-10	20	18	10	11.3		17.3				<u> </u>		
49.17	25		- dark yellowish	n brown.					MC- 06	25 26.5	6-13-13	26	18	13	6.4	98.1	12.4				000000000000000000000000000000000000000	21' of rod above the sensor for hammer calibration	-
44.17	30		Poorly graded S dense; grayish SAND; subango	brown; i	moist; few	fines; medium			SS- 07	30 31.5	5-8-10	18	18	10.5	7.2		16.8				ı, — ı	Calibrated hammer	
39.17	35		- SILTY SAND some fines; fine SAND; rounded	e to med	dium SANI				MC- 08	35 36.5	12-16-16	32	18	16	45.5	117.6	10.9				<u> </u>	Calibrated hammer	
:34.17 <b>—</b>	40		(со	ntinued	a)						REPORT BORIN			ORD	)						00000000	HOLE ID S0021R	
	Н	CA ligh-	LIFORN Speed Rail A	IIA Author	ity	URS HMM A	RLP	PAPE		P	ROJEC Californ RIDGE I	Г OR ia H	igh-	OGE Spe	NAM eed		າ D BY	PC	DSTM	ILE	DA <sup>-</sup> 1-2	TE SHEET 2 of 5	

Cali LOGG		ligh-Speed Train Fre BEGIN DATE Aug-21-13	esno to Bakersfield COMPLETION DATE Aug-22-13					TION (La									<b>1</b> :	<b>3157</b> DLE II	<b>77-00</b> 21R		
DRILL	ING CON	TRACTOR/DRILLER  g/E. Santellan	g == 10	IN-SIT						r	(. 4/		2 3/	· — · )	•		SU	IRFA	CE ELEV 7 ft (NA)		
DRILL MU[	ING MET	HOD RY(0'-86.5')		DRILL M-10	0 (D												BC 4	REH -7/8	OLE DIAM	METER	
MC(	2-1/2"),	E(S) AND SIZE(S) (ID) SPT(1-3/8")		1	mati	ic, 1	40	lbs, 30			•						8	5%		ENCY, ERI	
	HOLE BA	CKFILL AND COMPLET t grout	TION	GROU READI				DURING Not Re			1G			RILLI Recor		DATE	1	TAL 6.5 f		F BORING	
Elevation (ft)	Depth (ft)		Description			_	Sample Deptn (Tt)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		Remarks/ ther Tests	
229.17	45	cementation; lense	fine SAND; moderate d calcareous nodules. sM); hard; dark yellowish bro ; fine SAND.	own;		C- 4	1.5	14-21-28 17-34-52		18	18	53.2	99.9	19.3				200000000000000000000000000000000000000	Calibrate	ed hammer ed hammer y not noted or	No.: HSR13-57
10.34 BOREHOLE LOG - CHOI PER REV ARUP DO I K LIBRARY GFJ CHSK F-B MAS IEK DA IABASE GLB 172/14  11.34 BOREHOLE LOG - CHOI PER REV ARUP DO I K LIBRARY GFJ CHSK F-B MAS IEK DA IABASE GLB 172/14  11.35 BOREHOLE LOG - CHOI PER REV ARUP DO I K LIBRARY GFJ CHSK F-B MAS IEK DA IABASE GLB 172/14	50	grayish brown; moi	D with SILT (SP-SM); very of st; fine to medium SAND; bunded; micaceous.	dense;		1	11.5	16-27-38	65	18	10	14		11.9				000000000000000000000000000000000000000			04/02/2014 - KFP K
219.17 219.17	55	moist; little fines; m subrounded; micac SILT (ML); hard; gr	very dense; dark yellowish ledium SAND; subangular t eous; laminated with seam ayish brown variegated with aks; low plasticity; low dry ness.	to s of	M 1	2	55 63.5	24-31- 50/4"	81/10"	16	16							<u> </u>	sample t	ests conducte oo variegated ded layers app	' ∄
214.17	60	grayish brown; moi	D with SILT (SP-SM); very on the street of t	dense;																	
H		(contin	nued)				RI	EPORT	TITL	E.									HOLE	ID	$\dashv$
ILE LO							В	ORINO	3 RI				ROUT	E	PC	STM	IILE		S00:		
T.U.3A BOREHO	C/ Hig	ALIFORNIA h-Speed Rail Auth	nority CALECHYA P	ARUP	MAPY		C	ROJECT Californi RIDGE N	ia H	igh-	Spe   F	ed PREF		D BY				DA <sup>2</sup>	TE 27-14	SHEET 3 of 5	

Calif LOGG SV/N	SED BY NG	High	n-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE Aug-21-13 Aug-22-13 ACTOR/DRILLER		83	242	.735	ATION (La									HC S	31577 DLE ID 3002		
DRILL MUE SAMPI MC(: BORE	gg Dril ING ME D ROT LER TY 2-1/2"	IING/E THO ARY YPE(S Y), SP BACK	E. Santellan  D (0'-86.5') c) AND SIZE(S) (ID) PT(1-3/8") FILL AND COMPLETION	DRILL M-1 SPT F	RI 0 (I HAN Oma	G D44 MMEI atic,	l) R TY 140		G DF	RILLIN	-			RILL	,		2 BC 4 HA 8	74.17 DREHC -7/8 ir MMER 55%	ft (NAVD88) DLE DIAMETER	
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
					X	SS- 13	61.5	19-31-33	64	18	8	14.1	98.2	12.7						
209.17	65		- dense.		X	MC- 14	65 66.5	18-24-23	47	18	15	5.3	102.7	13.6						
204.17	70		Poorly graded SAND (SP); dense; variegated g brown and reddish brown; moist; trace fines; m SAND; rounded to subrounded; interbedded wit SANDY SILT (ML); hard; variegated brown and reddish brown; low plasticity; low dry strength; I toughness.	edium th		SS- 15	70 71.5	13-21-18	39	18	9							<u> </u>		
99.17	75		- very dense; brown; not interbedded.		X	MC- 16	75 76.5	19-29-31	60	18	17	4.3	101	7.2				<u> </u>		
194.17	80		Poorly graded SAND with SILT (SP-SM); very d grayish brown; moist; few fines; medium SAND rounded to subrounded.  (continued)															000000000000000000000000000000000000000		
							F	REPORT BORING	TITL 3 R	E EC(	DRE	)							HOLE ID S0021R	_
	Н	CA ligh-	LIFORNIA Speed Rail Authority	ARUP GH-SIMAD TI	Yeary		F (	PROJECT Californi BRIDGE N	OR ia H	BRII	DGE Spe	NAM eed	Traiı	n D BY		OSTM	IILE	DAT 1-2	EA	

	fornia		n-Speed 1	Train F	resno	to Bal	kersfield	d														1	3157	77-00	BEK	
LOGG SV/I		,— <b></b>	<b>1-Speed</b> BEG	IN DAT		COMPLI Aug-2		ATE					ATION (L 5 / E634									H	OLE II	21R	_	
		ONTR	ACTOR/DF	•	J	Aug-2	2-10		IN-SIT					557	J.J <del>.</del>	(14)	مام	<i>3                                    </i>	\ <del></del> ,	'		_		CE ELE	/ATION	
Gre	gg Dri	lling/E	E. Santella																			2	274.1	7 ft (NA	AVD88)	
DRILL MI II			D (0'-86.5')						DRILL M-10			١											OREH I-7/8		AMETER	
			) AND SIZE	(S) (ID)	)				SPT H			-	PE												CIENCY, ER	Ri
MC(	2-1/2'	'), SP	T(1-3/8")						Auto	ma	atic,	140	) lbs, 30			-						8	35%			
			FILL AND (	COMPLE	ETION				GROU READI			TER	DURING			١G									OF BORIN	G
ineai	ceme	ent gr	Out							П			Not Re	cord	<u>iea</u>		<u> </u>	NOT F	Reco	raea		8	6.5 f	<u>t</u>		
Elevation (ft)	ÖDepth (ft)	- Material Graphics			Des	cription					Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	ווק המשור המשור המשור ה	Remarks/ Other Tests	
			Poorly gramoist; tra	ce fines	; mediur	); dense m SANE	e; grayish O; rounded	brown;		<u></u>	SS- 17	80	15-24-26	60	18	10	11.8		14.3							
189.17	85										MC- 18	85 86.5	16-30-31	61	18	18	3.4		8.2							
			Borehole 10/21/201		ited at a	depth o	f 86.5 on																			∄
184.17			Soil mois became v drilling flu used as a surface o	vet durii iid. Soil i definiti	ng retrie moistur ve indica	val throuse indication of a	ugh rotary ation shou a potentia	methould not be	d oe																	
184.17	90		Surface o	i iice gi	ouriawa	ici tabic																				∄
179.17			See Bore and key to					cation cl	hart																	
179.17	95																									
-174.17	100																									
													REPORT	TITI	F									HOL	F ID	
												E	30RIN	G R	ECC					1-				S00	021R	
													DIST.	CC	UNT	Υ	F	ROUT	E	PC	DSTM	IILE		EA		
			Lifoi			1	LIRS	MM AR	RLP			F	PROJECT	OR	BRII	DGE	NAN	IE Troi:	`							
			Speed R			y -	CALFO	анти Нан-	SHALL TH	APV			Californ BRIDGE N						I D BY				DA	TE	SHEET	
						-										<u> </u>	D. N	lagg	i				1-	27-14	5 of 5	5

LOGG SV/N	fornia ED BY NG	a Higl	h- <b>Speed Train Fresr</b> BEGIN DATE Aug-29-13 ACTOR/DRILLER	no to Bakersfield COMPLETION DATE Sep-04-13	BOREH N207	258	34.84	42 /	TION (L / E634									Н Н S	3157 DLE II 3002	CT NUMBER <b>77-00</b> C <b>28R</b> CE ELEVATIO	)N
Greg DRILLI	gg Dri ING M	lling/E ETHO	E. Santellan	-165')	PS Lo	oggi RIG	ing											BC	61.2	4 ft (NAVD8 OLE DIAMET	38)
SAMPI MC(2	LER T 2-1/2' HOLE	YPE(S "), SF BACK	S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8") FILL AND COMPLETION	· )	SPT HA	AMM nati	ER 1 c, 1	40 ≣R	lbs, 30	G DR	ILLIN	-		ER D	Reco			HA 8	AMME 35%	R EFFICIENC	
Elevation (ft)	Depth (ft)	Material Graphics	۵	escription	-	Sample Location	Sample Namber	Sample Deptn (rt)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Rem Other	
				(AC). vith SILT (SP-SM); loose; e SAND; subrounded to		00000000000000000000000000000000000000		0			60	60	12						777777	COMP, RV Hand auger 1 no active gas cased from 0 6" casing	line. Hole -
56.24	5			vith SILT (SP-SM); loose; v fines; fine SAND; rounde is [NATIVE].	ed to	50500000000000000000000000000000000000	3 5	5			60	60	12							6" of cemente at ~6"	ed material
51.24	10		- few fines.			500	1	10												No sample al potential gas	10' to clear line
46.24	15		- loose; moist.		- 5 2	SS 01	3	6.5	3-4-5	9	18	9	5		19.6				<u> </u>	Jose from ga present to 15	
41.24	-20		moist; little fines; medi	medium dense; grayish bi um SAND; subrounded to ticity; lensed with SANDY diameter.	)																
	-		(continue	d)					-0057	T.T.										LIOLETE	
								В	EPORT ORINO ST.	3 RI				ROUT	E	PO	OSTM	IILE		HOLE ID S0028F EA	₹
	)	JA ligh-	LIFORNIA Speed Rail Author	URS HMM A	RLP SHALD THA			C	ROJECT aliforn RIDGE N	ia H	igh-	Spe	ed PREF		D BY				DA 1-2		EET of 8

SV/N	NG ING CON	ligh-Speed Train Fresno to Bakersf BEGIN DATE COMPLETION Aug-29-13 Sep-04-13 ITRACTOR/DRILLER	N20 IN-SIT	725 U TI	84. EST	842 ING	ATION (L. ! / E634	at/Lo	ng o	r Nor 5 ( <b>1</b>	th/Ea	st an 83 C	d Da	tum) 4)		HC S	3157 DLE ID 3002 JRFAC	
ORILLI AUG	ING MET SER(0'-1	10'), MUD ROTARY(10'-165')	PS L DRILL M-10	RIG 0 (D	)44)	)										BC 4	OREHO	
MC(2 BORE	2-1/2"),	E(S) AND SIZE(S) (ID) SPT(1-3/8"), ST(2-7/8") ACKFILL AND COMPLETION t grout	II	omat JND\	tic, WA	140	lbs, 30	3 DR	ILLIN			ER D	Reco			8 TC	35%	R EFFICIENCY, ERI DEPTH OF BORING ft
Elevation (ft)	Depth (ft)	Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
		SANDY SILT (ML); stiff; grayish brown; plastic; low dry strength; low toughness	; moist; non s.		ИС- 04	20 21.5	7-14-20	34	18	18		99.1	24.6		NP	UU 913	OOOOOOOOOO	PP: 5.5, 5.5, 4.25, 5.5 tsf TV: 0.88, 0.88, 0.88 tsf
36.24	25	SILTY SAND (SM); very dense; dark ye moist; fine SAND; weak cementation.  Lean CLAY with SAND (CL); hard; gray moist; trace GRAVEL; fine SAND; fine	yish brown;		3S- 05	25 26.5	39-45-49	94	18	9.5	42						<u> </u>	
31.24	30				MC- 06	30 31.5	16-22-29	51	18	15	82	96.8	24.6				1000	
26.24	35	Lean CLAY (CL); hard; dark yellowish by variegated with reddish brown; moist; lostrength; low toughness.	brown ow dry		SS- 07	35 36.5	9-16-21	37	18	14				31	9		<u> </u>	
21.24	40	Poorly graded SAND (SP); very dense; brown; moist; trace fines; medium SAN subrounded.	grayish ND; rounded to															
		(continued)					REPORT											HOLE ID
		ALIFORNIA				E	BORING DIST.	CC	ECC	Υ	F	ROUT	E	PC	OSTM	1ILE		S0028R EA
	Hig	ALIFORNIA ph-Speed Rail Authority	ALETZHINA HON-SHALD TO	TAPE		(	PROJECT Californ BRIDGE N	ia H	igh-	Spe   F	ed PREF		D BY				DAT 1-2	E SHEET 7-14 2 of 8

			Bakersfield MPLETION DATE ep-04-13	BOREI	HOLE 7258	E LC 34.8	DCA 342	TION (L / E634	at/Lo	ng o	r Nor 5 (N	th/Ea	st an 83 C	d Dat	um) <b>1)</b>		<b>1</b>	31577 31577 DLE ID 30028		
Greg DRILLI	gg Drilling/E ING METHO	ACTOR/DRILLER E. Santellan D , MUD ROTARY(10'-165'	')	PS L DRILL M-10	U TE .oggi RIG	STII ing											SL 2	JRFACE 61.24	E ELEVATION ft (NAVD88) LE DIAMETER	
SAMPL MC(2 BORE	LER TYPE(S 2-1/2"), SP	s) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8") FILL AND COMPLETION	,	SPT H Auto	AMM mati	IER ic, 1	140 ER	lbs, 30	G DR	ILLIN			ER D		,		HA 8	AMMER 35%	EFFICIENCY, ERI	
Elevation (ft)	Depth (ft) Material Graphics	Descri	ption		_	_	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
:16.24	45	SANDY SILT (ML); hard; broplasticity, low dry strength; locementation.  SILTY SAND (SM); dense; transfer grayish brown; moist; little file.	ow toughness; mode	erate		8 4 4	11.5	21-37-42 12-18-16			7.5							<u> </u>		
11.24	50	- dense; brown mottled with to subrounded.	reddish brown; rour	nded	<u></u> М. 1	0	50	19-29-43	72	18	14							0000		
06.24	55	Poorly graded SAND with S laminated with grayish brow yellowish brown, gray, mois subrounded; micaceous.	n, reddish brown, da	ark		1	55	14-20-19	39	18	16	13						<u> </u>		
01.24		Poorly graded SAND (SP); r brown with reddish brown; n SAND; subrounded to round	noist; trace fines; me																	-
		(continued)					R	EPORT	TITL	E									HOLE ID	
							В	ORINO IST.	3 RI				ROUT	E	PC	OSTM	IILE		S0028R EA	
<b>7</b>	CA High-	LIFORNIA Speed Rail Authority	LIRS HMM A	RUP	APV		C	ROJECT Californ RIDGE N	ia H	igh-	Spe F	ed REF		O BY				DATE 1-27	E SHEET 7-14 3 of 8	

	ECT NA F <b>ornia</b> ED BY		<b>-Speed Trai</b> BEGIN D	in Fresn	o to Bak	ersfield	₽∩DE	НΟ	1 = 1	004	TION (L	at/Lo	na o	Nor	th/Ec	et an	d Dat	um)		1	OJEC <b>3157</b> OLE ID		_
SV/N	١G		Aug-29	9-13	Sep-04		N20	725	584.	842	/ E634									S	002	28R	
			ACTOR/DRILLI Santellan	ER			IN-SIT													- 1		CE ELEVATION 4 ft (NAVD88)	
	ING ME		MUD ROTA	DV(10'-	.165')		DRILL M-1			١												OLE DIAMETER	
	-		) AND SIZE(S)		100)		SPT F	HAM	MEF	RTYF											-7/8 i MMEI	R EFFICIENCY, ERI	
			T(1-3/8"), ST								lbs, 30				^ <del></del>	-D D	DII 1 1	NO (	DATE	- 1	5%	DEDTIL OF DODING	
	ceme		FILL AND COM Out	IPLETION	N		READ				DURIN Not Re			NG		Not R				1	51.5	DEPTH OF BORING ft	1
																				-			
Elevation (ft)	Depth (ft)	Material Graphics		D	escription			_	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
								X	MC- 12	61.5	20-23-22	45	18	14		102.8	13.9 12.3				<u> </u>	DS	
96.24	65		grayish browr subrounded to	n with redoor rounded	dish brown d; micaceou  SP); dense	P-SM); dense; ; moist; fine SA us. ; grayish brown ; subrounded t		X 	SS- 13	65 66.5	15-19-20	39	18	9	13						000000000000000000000000000000000000000		-
91.24	70		rounded; mica	aceous.	h brown; m	noist; low plast			MC- 14	70 71.5	18-30-25	55	18	0							ı, — ı	Recovery not recorde	d
86.24	75		plasticity; low	dry stren	gth; high to	own; moist; me owghness.		X	MC- 15	75 76.5	13-30-39	69	18	18							000000000000000000000000000000000000000	Because clay is somewhat brittle, TV penetraton creates so disturbance PP: >4.5 tsf	
81.24	80		fine SAND.			sh brown; mois	 st;		16	78.5												TV: 0.27 tsf	-
			(0	continue	a)						EPORT	TITI	F									HOLE ID	
										В	BORIN IST.	Ģ RI				ROUT	E	PC	DSTM	ILE		S0028R EA	
<b>7</b>	Н	Al igh-s	LIFORN Speed Rail	VIA Author	rity	LRS HMM A	RUP	TAPE		C	ROJEC Californ RIDGE	ia H	igh-	Spe F	REF		D BY				DA1	TE SHEET 27-14 4 of 8	

PROJE Calif LOGG SV/N	<b>ornia</b> ED BY	ı High	n-Speed Train Fres BEGIN DATE Aug-29-13	no to Bakersfield COMPLETION DATE Sep-04-13					ATION (L : / E634									1 H	ROJEC 13157 DLE ID 8002		₹	
DRILLI	NG CO	lling/E	ACTOR/DRILLER E. Santellan	· 	IN-SIT PS I	U T Log	res gin	ΓING										SI 2	JRFAC 261.24	E ELEVAT	D88)	
AUG SAMPL MC(2	ER(0 LER T` 2-1/2" HOLE	'-10') YPE(S '), SP BACK	, MUD ROTARY(10' 5) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8" FILL AND COMPLETIO	)	M-10 SPT H Auto	I) 0 NAH Sma	D44 MEF atic, DWA	7 TYI 140	lbs, 30	G DF	RILLIN	-		ER D				H/ 8	I-7/8 i AMMEF 35%	n R EFFICIEN DEPTH OF	NCY, ERI	
Elevation (ft)	Depth (ft)	Material Graphics	[	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Rei Othe	marks/ er Tests	
	80		Poorly graded SAND v grayish brown; moist; rounded to subrounde	with SILT (SP-SM); dense; few fines; medium SAND; d.		_	SS- 17		20-31-28			9	76						0			
176.24	85					X	MC- 18	85 86.5	32-35-36	71	18	12		119.4	9.9					DS		
71.24	90		SILTY SAND (SM); ve fine SAND; rounded to	ry dense; grayish brown; r o subrounded.	moist;	I	SS- 19	90	14-27-27	54	18	9	18						000000000000000000000000000000000000			
66.24	95			SP); dense; grayish browi dium SAND; rounded to	 n;	X	MC- 20		19-26-28	54	18	17.5										
I 61.24 <b>-</b>	100		SAND; moderate cem calcerous nodules 1.0  Poorly graded SAND (	rd; grayish brown; dry; sor entation; blocky with white " in diameter. SP); very dense; grayish es; medium SAND; round				96.5														
			(continue	ed)				-	)EDOD7	エリティ	_									LUOI E IS		
								E	REPORT BORING DIST.	3 R				ROUT	E	P	OSTM	IILE		HOLE III S0028		
	Н	CA ligh-	LIFORNIA Speed Rail Autho	rity CALECAPER PAGE	H-SHARE TI	Trape		P	PROJECT Californ BRIDGE I	F OR ia H	BRII	OGE Spe	NAMed PREF	1E	າ D BY				DAT 1-2	E S	SHEET 5 of 8	

SV/N	NG	h <b>-Speed Train Fres</b> r BEGIN DATE Aug-29-13	o to Bakersfield COMPLETION DATE Sep-04-13	N20	725	84.	842	ATION (L / E634	at/Lc 897	ng oi 2.71	Nor 5 (N	th/Ea	st an 83 C	d Dat	um) <b>1)</b>		HC S	3157 DLE ID 3002	8R
Greg	gg Drilling/E ING METHO	ACTOR/DRILLER E. Santellan D IND ROTARY(10'-	.165')	IN-SIT PS L DRILL M-10	_ogg	ging	]										BC	61.24	CE ELEVATION  Ift (NAVD88)  DLE DIAMETER  n
MC(2 BORE	LER TYPE(S 2-1/2"), SF	S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8") (FILL AND COMPLETION		SPT H	IAMI mat	MER tic,	TYI 140 TER	lbs, 30	G DF	RILLIN			ER D		,		HA 8	AMMER 35%	R EFFICIENCY, ERI
Elevation (ft)	Depth (ft) Material Graphics	D	escription		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
	100		nse; grayish brown; wet;	fine		SS- 21 MC- 22	100 101.5	17-30-37	67	18	7		104.4		1		L	000000000000000000000000000000000000000	Geovision detected H20 level at 103' bgs
51.24	110	- very dense; some fine	es; medium to fine SAND			23	110 111.5	24-38-37	75	18	9							M	
16.24	115	to coarse SAND; medi strength; slow dilatanc CLAYEY SAND (SC);	r brown; wet; little SAND; um plasticity; medium dry; medium toughness. very dense; reddish brow own; wet; some fines; fin entation; mottled and	n		ИС- 24	115 116.5	32-45-54	99	18	10							<u> </u>	
11.24	120	brown; wet; trace fines	SP); very dense; grayish ; medium SAND; micace ing 1/16" thick at 1" spac																
							В	REPORT BORIN DIST.	GR				ROUT	E	PC	OSTM	IILE		HOLE ID S0028R EA
	CA High-	LIFORNIA Speed Rail Author	IRS HMM /	ARLIP M-SIMILE TO	PAPE			ROJEC Californ RIDGE	ia H	ligh-	Spe F	REF		D BY				DAT 1-2	E SHEET 6 of 8

	ECT N <b>fornia</b> ED BY		<b>n-Speed Tra</b> BEGIN D	<b>in Fresr</b> DATE	o to Bake COMPLET	rsfield ION DATE	BORE	HOI	LE L	.OCA	TION (L	.at/Lo	ng oi	Nor	th/Ea	ıst an	d Dat	um)		1	OJEC <b>3157</b> DLE ID			_
SV/N	NG ING C	ONTR	Aug-2 ACTOR/DRILL E. Santellan	9-13	Sep-04-			725 U T	84. EST	842 ING	/ E634									SU	002 JRFAC			
DRILL	ING M	ETHO	D	\D\//40'	165"		DRILL	RIC	}											BC	REHO	OLE DIAMETE		
			, MUD ROTA ) AND SIZE(S)		100 )		M-1	IAM	MEF	R TYF										HA		n R EFFICIENC	Y, ERi	_
MC(	2-1/2'	"), SP	T(1-3/8"), ST	Γ(2-7/8")	ı						lbs, 30				ΔFT	FR D	RILLI	NG (	DATE	- 1	35%	DEPTH OF B	ORING	
		ent gr			•		READ				Not Re					lot F				1	51.5			
Elevation (ft)	Depth (ft)	Material Graphics		D	escription			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Rema Other		
	125			D	евсприоп			111:	SS- 25		<u>ш</u> 19-29-33			9	2		N		<u>a</u>	<u> </u>		One	Tests	
			- dense; suba	angular; m	icaceous.				26	125 126.5	25-33-31	64	18	17		103.4	19.0				<u>0400000000000000000000000000000000000</u>			
31.24	130		- very dense; brown; weak	cementat	on; micaceo	ous.			SS- 27	130 131.5	17-29-32	61	18	9.5										
26.24	135		SILTY SAND brown; wet; for cementation.	ew fines; t			isn	X	MC- 28	135 135.5	64	64/6"	6	5.5							<u> </u>	64+ blows/6". would not driv 135.5'	- sample e past	:
21.24	.140		SANDY SILT variegated wi SAND; mediu dilatancy; me nodules.	ith reddish um plastic dium toug	brown; wet; ity; high dry s hness; frequ	fine to medi strength; rapi	id																	
			(0	continue	a)					R	EPORT	TITI	.E									HOLE ID		
_		•								D	BORIN IST.	G R	ECC	Υ	F	ROUT	E	PC	OSTM	ILE		S0028R	<u> </u>	
	H	JA ligh-	LIFORN Speed Rail	VIA Author	3 4	CALITORNA MG	H-SHID T	TANK	١	0	ROJEC Californ RIDGE	ia H	igh-	Spe F	ed REP		O BY				DAT 1-2		EET of 8	_

LOGGED BY SV/NG	High-Speed T BEGI	N DATE	OOMBL ETIO			_	_	_					_	_				13	ວງວາ	7-00
J V/1 V J	Διια	-29-13	Sep-04-13	ON DATE					TION (La / E6348									HC	LE ID	28R
	NTRACTOR/DRI	ILLER	Оср-о го		IN-SITU				/ L00+0	3312	/ 1	J (1	NAD	00 0	<i>,</i> ,, , ,	7)				CE ELEVATION
	ng/E. Santellar	n			PS L															4 ft (NAVD88)
DRILLING MET AUGER(0'-	тнор 10'), MUD RO	TARY(10'-	165')		DRILL M-10			)											REH -7/8	OLE DIAMETER in
SAMPLER TYP	PE(S) AND SIZE(	(S) (ID)	,		SPT H	AMN	ИER	TY										HA	MME	R EFFICIENCY, ERI
	, SPT(1-3/8"), ACKFILL AND C								lbs, 30			-	٨٢٦١		ווח	INIC /	\_T_	- 1	5%	DEPTH OF BORING
Neat cemen		OMPLETION	l		READI			IEK	Not Re			NG				rded	JATE	1	51.5	
Elevation (ft)	Waterial Oraphics SILTY SAN micaceous	ND (SM); den	escription	t; fine SANI		18	SS- 29	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	® Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (pst)	Drilling Method	
16.24 145							30	145	17-24-40	64	18	15	43	108.8	18.3				<u> </u>	
∃1																				
11.24 150	- very dens	se; dark yello	wish brown; so	ome fines.			31		18-30-32	62	18	8								
111.24 150			wish brown; so		2013.		31	150 I51.5	18-30-32	62	18	8								
06.24 155	Borehole to Soil moists became w drilling flui used as a surface or	erminated at ure indicated tet during retr d. Soil moist definitive indi free groundw	a depth of 151 as "wet" beca ieval through r ure indication ication of a pol	1.5' on 9/4/2 use sample rotary metho should not tential phrea	es od be atic		31		18-30-32	62	18	8							0000000	
	Borehole to Soil moists became w drilling flui used as a surface or	erminated at ure indicated tet during retr d. Soil moist definitive indi free groundw	a depth of 151 as "wet" beca ieval through r ure indication ication of a pol vater table.	1.5' on 9/4/2 use sample rotary metho should not tential phrea	es od be atic		31	151.5	18-30-32 EPORT 3ORING	TITL	E	DRE		ROUT	Ē	PC	DSTM	IILE	0000000	HOLE ID S0028R
06.24 155	Borehole to Soil moistu became w drilling flui used as a surface or See Boreh and key to	erminated at ure indicated et during retr d. Soil moist definitive indi free groundw nole Log Lege test data and	a depth of 151 as "wet" beca ieval through r ure indication ication of a pot vater table.  and for soil class d sampler type	1.5' on 9/4/2 use sample rotary metho should not tential phrea	es od be atic		31	R   E   C	EPORT BORING	TITL G RI	E ECC UNT	DRC Y	R		E	PC	DSTM	IILE	0000000	S0028R
06.24 155	Borehole to Soil moists became w drilling flui used as a surface or	erminated at ure indicated tet during retr d. Soil moist definitive indiffere groundwhole Log Lege test data and	a depth of 151 as "wet" beca ieval through r ure indication ication of a por vater table.  and for soil class d sampler type	1.5' on 9/4/2 use sample rotary metho should not l tential phrea ssification o	es od be atic		31	R E	EPORT BORING	TITLE CO	E ECC UNT BRIE igh-	DRD Y DGE Spe	NAM eed	IE Trair			DSTM	ILE	DA	S0028R EA

	ECT NAM																		CT NUMBER	٦
		ligh	I-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE					ATION (L									HC	)LE I		$\dashv$
SV/I		ITD (	Aug-26-13 Aug-28-13					/ E635	0083	3.04	2 (1	NAD	83 (	CA Z	4)				29R	
			ACTOR/DRILLER :. Santellan	IN-SIT	U	IES	IING												CE ELEVATION 7 ft (NAVD88)	
DRILL	ING MET	HOE	)	DRILL	RI	G											_		OLE DIAMETER	$\dashv$
		-	MUD ROTARY(5'-125')	M-10	•		•											.0 in		
			) AND SIZE(S) (ID) T(1-3/8"), ST(2-7/8")	SPT H				PE ) lbs, 30	)-incl	h dr	go							MME 5%	R EFFICIENCY, ERI	
			FILL AND COMPLETION	GROU	JNE	OWA		DURIN				AFT	ER D	RILLI	NG (	DATE	- 1		DEPTH OF BORING	-
Piez	ometer			READI	INC	SS		Not Re	corc	led		1	Not F	Reco	rded		1:	25 ft	1	4
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests	
	0 = 1		SILTY SAND (SM); loose; brown; moist; fine SA		500	B- 01	0	Ш	_	60	60	25		_				টা	CBR, COMP, RV Bulk sample using hand	
20.07 PARTICLE INC CAS TOTAL TOTA	5		- trace GRAVEL.  Poorly graded SAND with SILT (SP-SM); mediu dense; brown; moist; few fines; fine SAND; rour to subrounded.  - trace GRAVEL; fine GRAVEL; speckled with b reddish brown minerals.	nded		SS-02	5 5 6.5 10	4-5-5	10	18	10	5	92.88	14.4 12.8					Gravel sloughing into hole. COLL DS	
			Poorly graded SAND (SP); medium dense; gray brown to brown; moist; trace fines; fine to mediu SAND; rounded to subrounded.	 sh m																
245.07	15					SS-	15	2-5-7	12	18	9							000		$\exists$
			- with reddish brown streaks.		X	04	16.5					4		20.6				000000000000000000000000000000000000000		
٥ ۲	= 1																			$\exists$
240.07	20_=																	$\Omega$		耳
2			(continued)																	$\bot$
							E	REPORT BORIN DIST.	G RI				ROU	ГЕ	PC	OSTM	1ILE		HOLE ID S0029R EA	$\dashv$
	C	AI	IFORNIA JURS HMM IA	ARUP				ROJEC												$\dashv$
d (	Hic	h-S	LIFORNIA Speed Rail Authority	H-SHAD T	PAPI			Californ RIDGE I						n D BY				DA <sup>-</sup>	TE SHEET	$\dashv$
5.0.			Programmy =					ייעוטטבו	4OIVIE	ンレベ	i	D. N	lagg	ji					27-14 1 of 7	

				I Train Fr GIN DATE .ug-26-13		Bakersfield MPLETION DATE					ATION (L									<b>1</b>	<b>3157</b> DLE ID	)	R 	_
ORILLI Greg	ING C	lling/E	ACTOR/I	DRILLER	A	ug-28-13	IN-SIT	U T	ES			000	J.U4	۷ (I)	VAD	03 C	<i>γ</i> ∧	+)		SL 2	60.07	E ELEVAT	D88)	_
		ETHO )'-5').		OTARY(5	5'-125')		DRILL M-10			.)										- 1	REHO	OLE DIAME	ETER	
SAMPL	LER T	YPE(S	S) AND SI	ZE(S) (ID) "), ST(2-7			SPT F	IAN	IME	R TYI	PE Ibs, 30	)-inc	h dr	ор						HA		R EFFICIE	NCY, ER	i
BORE		BACK		COMPLE			GROL READ			TER	DURING Not Re			NG			RILLI				TAL ( 25 ft	DEPTH OF	BORING	)
											1100110					1001		uou		-				_
Elevation (ft)	>Depth (ft)	Material Graphics			Descri	ption		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		emarks/ er Tests	
						onal dark brown stre ); micaceous.	eaks	X	MC- 05	20	6-12-14	26	18	11		100	13.8 12.5				MANNAM	Sloughing sampler re		•
35.07	25		modera layers.	te to low pl	asticity; r	own; moist; fine SAN noderately cemented rese; brown with gray fine SAND.	d		SS- 06	25 26.42	7-27- 50/5"	77/11"	17	15.5	64									
30.07	30							X	MC- 07	30 31.42	16-31- 50/5"	81/	17	15	23.9		14.9					Calcite cer layers	nentaton i	n
25.07	35		reddish	brown; mo	ist; low p	grayish brown and lasticity; medium dry dium toughness.	y		SS- 08	35 36.5	13-19-20	39	18	11.5	93							Grayish ca seams	ılcite partin	ig at
20.07	40		with gra SAND; dilatand SAND (	ayish brown medium pla by; medium SC): mediu brown, mo	and redo asticity; m toughnes um dense pist, little t	); very stiff; brown m dish brown; moist; lit ledium dry strength; ss; layered with CLA , brown varigated wi o few fines.	ttle slow YEY														200000000000000000000000000000000000000			-
				(conti	nued)					R	REPORT	TITI	E									HOLE I	D	
										E	BORING DIST.	G RI				ROUT	E	PC	OSTM	ILE		S002		
	H	CA ligh-	LIFC Speed	Rail Aut	A hority	LIRS HMM A	ARLIP H-SIMILD TO	VAPV		(	ROJEC Californ RIDGE I	ia H	igh-	Spe F	REF	Trair	D BY				DAT		SHEET 2 of 7	

SV/N	NG		Aug-26-13	resno to Bakersfield COMPLETION DATE Aug-28-13	N20	705	526	.117	ATION (L 7 / E635									S	3157 DLE ID 3002	9R	_
Greg ORILLI	g Drilli NG ME	ing/E	ACTOR/DRILLER  :. Santellan  D  MUD ROTARY(:	5'-125')	DRILL M-1	. RIC	<b>3</b>		i									2 BC	60.07	CE ELEVATION 7 ft (NAVD88) OLE DIAMETER	
MC(2 BORE	LER TY 2-1/2")	PE(S , SP BACKI	) AND SIZE(S) (ID) T(1-3/8"), ST(2- FILL AND COMPLE	7/8")	SPT F	HAM oma	IMEI atic,	R TY	PE ) lbs, 30 ) DURING Not Re	G DF	RILLIN	•			Reco			H/ 8	AMMEI 85%	R EFFICIENCY, ERI	
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	40		SANDY SILT (ML	); some SAND; fine SAND.		_	MC- 09	41.5	8-18-21	39		16		99.9	26.3 16.9 16.4		9 NP	-	0000000000	DS Pitcher barrel	
15.07	45		variegated reddis medium plasticity Lean CLAY (CL);	ML); hard; dark yellowish bro h brown; moist; trace SAND; r; medium toughness. hard; brown variegated with i			SS- 11	44 45 46.5	3-15-25	40	18	12.5	97								
10.07	50			ce SAND; fine SAÑD.  (1); dense; dark yellowish brow	 vn;																•
10.07			Poorly graded SA	ND with SILT (SP-SM); densi	 e;	X	MC- 12	50	15-26-36	62	18	12	46	93.9	23.9	•			0000		-
05.07	55		grayish brown var fine to medium S/ micaceous.	riegated dark gray; moist; few AND; subrounded to subangu g horizontal.	rfines; ılar;	X	SS- 13	55 56.5	12-23-21	44	18	8.5	12		13.6						
00.07	60																				
			(cont	tinued)				F	REPORT	TITI	.E									HOLE ID	
		e A CI	UE	A 7				E	BORING DIST.	G R	ECC	Υ	F	ROUT	E	P	OSTM	IILE		S0029R EA	
	Hi	gh-S	LIFORNI Speed Rail Au	thority CALFERDA H	ARLIP IGH - SHIRD: TI	TAPY.	1	(	PROJECT Californ BRIDGE N	ia H	ligh-	Spe F	ed PREF	Traiı	D BY				DA1	TE SHEET 27-14 3 of 7	_

PROJE <b>Calif</b> LOGG			n-Speed Train Fres	sno to Bakersfield COMPLETION DATE	BORE	=HC	DLE I	OCA	ATION (L	at/Lo	na o	r Nor	th/Ea	ast an	nd Da	tum)		1	OJEC <sup>*</sup> <b>3157</b> DLE ID	T NUMBE <b>7-00</b>	R	
SV/N DRILLI	NG ING C	ONTR	Aug-26-13 ACTOR/DRILLER Santellan	Aug-28-13		)70	526	.117	/ E635									SU	002 JRFAC	E ELEVA		
DRILLI	ING M	ETHOI		125')	DRILL M-1			····										BC		ft (NAV )LE DIAM		
MC(2	2-1/2' HOLE	'), SP BACK	) AND SIZE(S) (ID) T(1-3/8"), ST(2-7/8 FILL AND COMPLETIO			oma UNE	atic,	140	) lbs, 30	G DF	RILLIN			ER D				8 TC	85%		NCY, ERI	
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		emarks/ ner Tests	
	60		- grayish brown; trac	e fines; medium SAND.		X	MC- 14	61.5	16-21-26	47	18	16		94.7	17.9 12.0					Sugary sa	nd	
95.07	65		Lean CLAY (CL); har reddish brown; few S low dry strength.	rd; grayish brown variegate SAND; fine SAND; low plas	ed with sticity;		SS- 15		12-27-23	50	18	8.5	91						000000000000000000000000000000000000			
	70		reddish brown varieg	.); hard; grayish brown with ation; fine SAND; with bro Interbedded with CLAYEY	wn	X	MC- 16	66.5 68 69.5	18-32-33	65	18	13	91									-
90.07	70		SILTY SAND (SM); o moist; little fines; fine	lense; grayish brown to bro e SAND.	own;	X	MC- 17	70 71.42	10-20- 26/5"	46/	17	16										
85.07	75			(SP); dense; dark yellowisines; medium to fine SANI			SS- 18	75 76.5	14-19-18	37	18	3.5							<u> </u>			
80.07	80		brown variegated wit plasticity; low dry stre toughness; interbedo (SC): dense; brown;	AND (CL-ML); very stiff; grath brown; moist; medium ength; slow dilatancy; low led with SILTY CLAY with moist; little fines; fine SAN	SAND																	
			(continu	ıed)					REPORT	ידודי	F									HOLE	ID	
								E	BORING DIST.	3 R				ROUT	E	PO	OSTM	IILE		S002 EA		
	H	CA ligh-	LIFORNIA Speed Rail Autho	Drity CALSTONIA H	ARLIP GH-SHALLIT	TIAPI			PROJECT Californ BRIDGE 1	ia H	ligh-	Spe	ed PREF		D BY				DAT 1-2	E 7-14	SHEET 4 of 7	

	ECT N. <b>fornia</b>		<b>1-Speed Train Fres</b> BEGIN DATE	no to Bakersfield														1	31577		
LOGG SV/N		,	BEGIN DATE Aug-26-13	COMPLETION DATE Aug-28-13					ATION (L 7 / E635										OLE ID <b>3002</b>		
Greg	gg Dril	lling/E	ACTOR/DRILLER E. Santellan		IN-SIT			ΓING										2	260.07	E ELEVATION ft (NAVD88)	
	ING ME SER(0		D MUD ROTARY(5'-1	25')	DRILL M-10			)											)REHC '.0 in	DLE DIAMETER	
MC(2	2-1/2"	'), SP	) AND SIZE(S) (ID) T(1-3/8"), ST(2-7/8'		SPT H				PE Ibs, 30	-inc	h dr	эр							AMMEF 35%	R EFFICIENCY, ERI	
	HOLE omete		FILL AND COMPLETIO	N	GROL READ			TER	DURIN Not Re			IG		ER D				1	OTAL D 25 ft	EPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics	I	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	<del>-</del> 80 =		<u> </u>	эссоприон			MC- 19	80	15-16-19			10.5	7				ш			PP: 2.5 tsf TV: 0.90 tsf	=
			SILTY SAND (SM); ve dark yellowish brown;	ery dense; brown mottled moist; fine SAND.	with	<u>X</u>		81.5													
75.07	85		Poorly graded SAND brown; moist; trace fir micaceous.	(SP); very dense; dark ye nes; fine to medium SANI	llowish D;	X	SS- 20	85 86.46	29-50-50	100	17.5	8.5	41						<u> </u>		-
70.07	90					X	MC- 21	90	25-45- 50/5"	95/ 11"	17.5	14									
65.07	95		SANDY SILT (ML); ha	ard; dark yellowish brown;	 ; moist;		SS-	95	19-30-32	62	18	9							<u> </u>		
		<del>-</del>	SII TV SAND (SAA). E-	ard dark vallouish besum			22	96.5	75 50 52				70						20000000000		
60.07 <b>-</b>	100		mottled with reddish be	ard; dark yellowish brown prown; wet; little fines; find	e																-
			(continue	ed)																	
								E	REPORT BORING DIST.	3 R	E ECC OUNT			ROUT	E	P	OSTM	IILE		HOLE ID S0029R EA	
	H	CA ligh-	LIFORNIA Speed Rail Autho	URS HMM	ARLIP IGH-SHALD TH	VAPI			ROJEC Californ RIDGE I	ia H	igh-	Spe	ed		D BY				DAT 1-2	E SHEET 7-14 5 of 7	_

Cali LOGG SV/I DRILL Gree DRILL AUC SAMP MC(	NG ING CON gg Drillin ING METI GER(0'-5 PLER TYPI (2-1/2"),	igh-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE Aug-26-13 Aug-28-13 TRACTOR/DRILLER g/E. Santellan	DRILL R M-10 ( SPT HAI Autom	TES IG (D44 MME	i.117 TING I) R TYI , 140	/ E6350	0083 -incl	3.042 h dro	2 (N	IAD	83 C	CA Z4	4)	ΠΔΤΕ	SU 2 BC 7 HA	3157 DLE ID 6002 IRFAC 60.07 DREHC .0 in MMER	)	
	ometer	ON ILL / WYD GOWN LETTON	READING			Not Re					Not F	Reco			1	25 ft	JEI TH'O' BOKING	_
Elevation (ft)	© Depth (ft)	Description	Sample Location		Sample Depth (ft)	88-38. Blows per 6 in.	28 N-Value (bl/ft)	⇔ Penetration (in)	B Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
1.0.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY_MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  1.0.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY_MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  2.0.000000000000000000000000000000000	110-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	SANDY CLAY (CL); very dense; grayish brown reddish brown variegation; wet; some SAND; fin SAND; medium plasticity; low dry strength; slow dilatancy; medium toughness; laminated with 1 CLAYEY SAND, reddish brown.  LEAN SANDY SILT (ML); stiff; dark yellowish brown; some SAND; fine SAND; low plasticity; low strength; rapid dilatancy.  - grades to poorly graded SAND (SP): very dent grayish brown; wet; few fines; fine to medium Smicaceous.  SILTY SAND (SM); dense; variegated grayish brown and brown; wet; some fines; SAND; micaceous; interbedded with SANDY SI (ML): hard; grayish brown; wet; some SAND; lop plasticity; low toughness; rapid dilatancy; low distrength; laminated.  SANDY CLAY (CL); very stiff; grayish brown with reddish brown streaks; wet; little SAND; fine to coarse SAND; medium plasticity, high dry strenslow dilatancy; reddish brown streaks and pock Grades to CLAYEY SAND (SC): very dense; grown with reddish mottling; wet; little CLAY; m SAND; weak cementation; micaceous.	se; SAND; The light, rough, ro	SS-24  MC-25  SS-26	101.5 106.5 106.5	17-48- 50/3" 5	98/ 9"	18	9.5	71						222222222222222222222222222222222222		04/02/2014 - RFP NO : HSR13-57
- CHS		(continued)			1 -	EDODE	T,T.										LIOLEID	_
EHOLE LOG	) C	ATIEODNIIA Turs HMM.	ARUP		D	REPORT BORING DIST. PROJECT	CO	UNT	Υ	F	ROUT	Έ	PC	OSTM	IILE		HOLE ID S0029R EA	
1.0.3A BOF	Hig	ALIFORNIA h-Speed Rail Authority	GH-EHVELD THAP			Californ	а Н	igh-	Spe P	ed REP		D BY				DAT 1-2	E SHEET 27-14 6 of 7	

MNG	ROJECT NAME California High-Speed Train Freeno to Bakersfield											1		<b>-UU</b> MOMB	EK	
BLILLING CONTINACTOROPHILLER reggo Drilling Seathelian BLILLING METHOD DRILL RIG GOOD TOTATY (5-125) M-10 (D44) M-10 (D44												HOL	E ID	-00		
PRIZE TYPE(S), AND SEZE(S), (ID)  WHEN EN TYPE(S), AND SEZE(S), AND SEZE(		ING CONTRACTOR/PILLER go Polity (F. Santellan ING METHOD DRILL RIG DRING METHOD DRILL RIG M-10 (D44) M-10 (D44														
ULBINO METHOD  UDGER(07-5), MUD ROTARY(5-125)  M-10 (D044)  SPI HAWMER TYPE  AUtomatic, 140 lbs, 30-Inch drop  REHOLE BROKELLARIO COMPLETON  READINGS  OROLOWATER DURING SIZELING AFTER DRILLING (DATE)  READINGS  Not Recorded  N		IN-SITU TI	ESTING	3								1				
MUSER(VS-5), MUD ROTARY(S-125) M-10 (D44) MER PTYPES, AND SER(S) (D0) ROC2-127), SPT(1-39R), ST(2-78R) Automatic, 140 lbs, 30-inch drop REPLOYER SERVILL AND COMPLETION RECORDER  READINGS REPLOYER DURING DRILLING RECORDER  READINGS RECORDER  READINGS REPLOYER DURING DRILLING NOT RECORDER  READINGS RECORDER  READINGS REPLOYER DURING DRILLING NOT RECORDER  READINGS REPLOYER DURING DRILLING REPLOYER DRILLING REPLOYER DURING DRILLING REPLOYER DURING DRILLING REPLOYER DRILLING REPLOYER DURING DRILLING REPLOYER DRILLING REPLOYER DRILLING REPLOYER DURING DRILLING REPLOYER	== =	DDII I DIC										_				
MELER TYPES) AND SZE(S) (D)  GROUNDWATER DURING DRELING. ATER DRELING (AND EPPH OF BORNO)  READONS. Not Recorded		1										1		LE DIAN	/IETER	
Automatic, 140 lbs, 30-inch drop REHOLE BACKFILL AND COMPLETION RECORDER  READINGS  REQUIREMENT DURING PRUILING (ADTE) READINGS  READING	SAMPLER TYPE(S) AND SIZE(S) (ID)	· `		PE								-		EFFICI	ENCY, EF	₹i
READINGS   Not Recorded   12.5 ft	MC(2-1/2"), SPT(1-3/8"), ST(2-7/8")															
Description  Descr	SOREHOLE BACKFILL AND COMPLETION						G Al				ATE)	1		EPTH C	F BORIN	G
Description  Descr	Piezometer	READING	5 ——	Not Re	corde	ed		Not		rded		12	5 ft			
Borehole terminated at a depth of 125.0' on 8/28/2013.  Soil moisture indicated as "wer" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be surface or free groundwater table.  See Borehole Log Legend for soil classification chart and key to test data and sampler type.  See Borehole Log Legend for soil classification chart and key to test data and sampler type.  REPORT TITLE BORING RECORD S0029R S0029R BOREHORNIA High-Speed Rail Authority  REPORT TITLE BORING RECORD S0029R PROJECT OR BRIDGE NAME California High-Speed Train PROJECT OR BRIDGE NAME California High-Speed Train PROJECT OR BRIDGE NAME California High-Speed Train	Description  Description	Sample	120 27 121. U- 28	12-36-49	85	18	16	Z00 Wash (%)	ture	Liquid Limit (%)	Plasticity Index (%)	TXUU	Casing	Ot PP: 3.0 t TV: 0.90	ther Tests sf tsf	ed.
CALIFORNIA High-Speed Rail Authority  REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER   PREPARED BY DATE SHEET	8/28/2013.  Soil moisture indicated as "wet" because samp became wet during retrieval through rotary met drilling fluid. Soil moisture indication should no used as a definitive indication of a potential phr surface or free groundwater table.  See Borehole Log Legend for soil classification	hod ot be reatic											<u> </u>			
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE  CALIFORNIA High-Speed Rail Authority  REPORT TITLE BORING RECORD S0029R DIST. COUNTY ROUTE POSTMILE  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET	25.07 135															
CALIFORNIA High-Speed Rail Authority  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET	20.07-140													HOLE	: ID	
CALIFORNIA High-Speed Rail Authority  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET								DO:	UTC	D0:	OT \$ 411	_		S00	29R	
High-Speed Rail Authority    BRIDGE NUMBER   PREPARED BY   DATE   SHEET				JIST.	COL	٦N L)	Y	KO	UIE	POS	SIMIL	LE.		EA		
High-Speed Rail Authority    BRIDGE NUMBER   PREPARED BY   DATE   SHEET	CALIFORNIA	ARLIP	h	PROJECT	OR E	3RID	GE N	AME						I		
				Californ	ia Hiç	gh-S	Spee	d Tra								
	riight-speed kall Authority	THE PERSON NAMED IN COLUMN		BRIDGE N	NUMBI	ER	PR	EPAF	≺ED BY	•			DATE	111	SHEET	7

Cali	<b>fornia Hi</b> EED BY	gh-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE  Sep-10-13 Sep-11-13				ATION (L 5 / E635									<b>1</b> :	3157 DLE ID	
DRILL Greç	gg Drilling	RACTOR/DRILLER I/E. Santellan	IN-SIT				4l	<i>j.1</i> 0	ı (IV		C	,r, <u>,</u> <u>, , , , , , , , , , , , , , , , ,</u>	<u>''</u>		SU	RFA	BOR CE ELEVATION 5 ft (NAVD88)
	ING METH	OD ), MUD ROTARY(5'-101.5')	DRILL M-10	RIG ) (D44	1)											REH -7/8	OLE DIAMETER
	•	(S) AND SIZE(S) (ID)	SPT H	•	<u> </u>	PE											R EFFICIENCY, ERI
		SPT(1-3/8")				) lbs, 30				^ <del></del> -		DII I I	NO /		1	5%	DEDTIL OF DODING
	cement	CKFILL AND COMPLETION  grout	READI		NER	Not Re			iG i			RILLI	-	JATE		)1.5	DEPTH OF BORING ft
Elevation (ft)	Depth (ft)	Description  SILTY SAND (SM); loose; grayish brown varieg with reddish brown; moist; fine SAND; [FILL].	ated	公公公公 Sample Location ユ 中 Sample Number	o Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	8 Penetration (in)	8 Recovery (in)	200 Wash (%)	Dry Density (pcf)	् Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests  CBR, COMP, CORR — Hand augered down to 5— depth bgs
252.95	5-1	SILTY SAND (SM); medium dense; brown; moi- little to some fines; fine SAND; [NATIVE].  SANDY SILT (ML); stiff; grayish brown; moist; fi SAND; low plasticity; low dry strength; rapid dilatancy; low toughness.		836363636363636363636363636363636363636	5 5 6.5	6-9-6	15	18	10	69.7		17.5					4.0' - 4.3', Moderately cemented layer of sand
SK F-B_MASIEK DATABASE.GLB 1/2//14 PR 26 26 96	10	SILTY SAND (SM); loose; grayish brown varieg with reddish brown; moist; some fines; fine SAN Poorly graded SAND (SP); loose; grayish brown variegated with reddish brown; moist; trace fine	ND. - — — —	MC- 03	10 11.5	4-5-6	11	18	12		104.8	0.3				000000000000000000000000000000000000000	Observed gravel in sloughed material
10.34 BOKEHOLE LOG - CHS IP 1-B KEV AKUP DO I KLIBKAKY, MAS I EK LIBKAKY, GPU CHS 15-6-75-7-7-8-7-7-7-7-7-7-7-7-7-7-7-7-7-7-7-	15	SANĎ.  Poorly graded SAND with SILT (SP-SM); mediu dense; light brown; moist; fine SAND.		SS- 04	15	3-5-5	10	18	10	7.7		19.4				<u> </u>	Observed gravel in sloughed material
237.95	20	Poorly graded SAND (SP); medium dense; gray brown; moist; trace fines; medium SAND; subato rounded.														100000000000000000000000000000000000000	
<u>ع</u>		(continued)			Le	DEDODI	エリエッ										LIOLEID
501					E	REPORT BORIN	Ģ RI	ECC									HOLE ID S0030R
H 40 40 40 40 40 40 40 40 40 40 40 40 40						DIST.	CO	UNT	Υ _	R	OUT	E	PC	STM	ILE		EA
	≥ C/	ALIFORNIA LURS HMM	ARLIP			ROJEC						`	1				1
a Ke	High	n-Speed Rail Authority	BH - SHALD TW	APV		BRIDGE			P	REP	ARE	D BY				DA	
0.										). M	lagg	i					27-14 1 of 6

	ECT NAM F <b>ornia H</b> ED BY		-Speed Train BEGIN DA Sep-10-		no to Bak COMPLE Sep-1		BORE N20	HO 672	LE L 265.	OCA	TION (I	at/Lc	ong o	r Nor	th/Ea	st an	d Dat	um)		<b>1</b>	3157 DLE ID 3003	)	IDER	
RILLI		ıg/E	CTOR/DRILLER . Santellan		2001		IN-SIT	UT	EST			•	<i></i>	- (1				,		SL 2	JRFA0 257.9	CE ELE 5 ft (N	VATION 88DVA	3)
			) //UD ROTAR\	Y(5'-10	)1.5')		DRILL M-10			)											JREH0 -7/8 i		AMETE	К
			AND SIZE(S) (II	D)			SPT F					·	la ala							H/	AMME		CIENCY	, ERi
			Γ(1-3/8") FILL AND COMP	I ETION	N.						Ibs, 3			•	ΔFT	FR D	RILLI	NG (	DATE		35%	DEPTH	OF BO	RING
	cement			LLTIO			READ				Not R						Recor			1	01.5		. 0. 50	
							•										(%)		(9)	•				
Elevation (ft)	Depth (ft)	Material Graphics		D	Description				Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		Remar Other T	
32.95	25—————————————————————————————————————		SILTY SAND (S some fines; fine some fines; fine some fines; fine some fines; fine some fines; fines some fines; so	e SAND d; grayis fine SA dilatano	sh brown va ND; low ploy; low toug	ariegated with asticity; low dr phness.	y	X	SS- 06	25 26.5	6-11-15			10	91.8		24.1				<u> </u>		Grades fr	om SM to
27.95	30								MC-	30	11-16-19	35	18	17										:
			Poorly graded S dense; grayish rounded; micac	brown;	vith SILT (S moist; med	SP-SM); mediu dium to fine SA	m ND;	X	07	31.5						105.7	7.7				<u> </u>	DS		
22.95	35							X	SS- 08	35 36.5	7-9-12	21	18	7	14		6.7				000000000000000000000000000000000000000	No rec	covery in s	shoe
17.95	40			•																	MINIM			
			(co	ntinue	a)					[	EPORT	ידוד	F									ЦΩ	LE ID	
										E	BORIN DIST.	GR				ROUT	E	PC	DSTM	ILE			030R	
	C/ Hig	AL Jh-S	IFORN peed Rail A	IIA Nuthor	rity	LIRS   HMM   A	H-SHID TI	VAPV		(	ROJEC Californ RIDGE	ia H	ligh-	Spe F	ed REF	Trair	D BY				DA1	ΓΕ 27-14	SHE 2	ET of 6

	ECT NAM <b>fornia H</b> ED BY	<b>igh-Speed Train Fres</b> BEGIN DATE	no to Bakersfield COMPLETION DATE	BORE	HOL	LE L	OC/	ATION (L	at/Lo	ng oi	Nor	th/Ea	ıst an	id Dat	tum)		1	OJEC <b>3157</b> DLE ID	
		Sep-10-13 TRACTOR/DRILLER	Sep-11-13	N20				6 / E635	0740	0.76	1 (N	IAD	83 C	CA Z	4)		_	SOO3 JRFAC	OR CE ELEVATION
	gg Drilling	g/E. Santellan HOD		DRILL	RIC	<b>.</b>											_		5 ft (NAVD88) DLE DIAMETER
AUG	ER(0'-5'	'), MUD ROTARY(5'-1	01.5')	M-10	0 (E	)44	-										4	-7/8 i	n
		E(S) AND SIZE(S) (ID) SPT(1-3/8")		SPT H				PE ) lbs, 30	-inc	h dr	ор							AMMEI 35%	R EFFICIENCY, ERI
BORE	HOLE BA	CKFILL AND COMPLETIC	N	GROU			TER	DURING			IG						1		DEPTH OF BORING
neat	cement	grout		TALA				Not Re	cord	ded			Not F	Reco	rdeo		1	01.5	π
Elevation (ft)	Depth (ft)		Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	∠ N-Value (bl/ft)	⇔ Penetration (in)	O Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests No recovery - suspect so
		SILTY CLAY (CL-ML)	; hard; dark greenish gray	with		09 MC-	41.5		45		18		94.8	25.8	19	6		00000000000	clay
		light gray mottling; mo high dry strength; no moderate cementatio	oist; little SAÑD; high plas dilatancy; high toughness; n.	ticity;	M	10	43.5						90.7	27.1				00000000	Munsell color 10GY 4/1
12.95	45	gray; moist; medium to cementation; frequent - olive brown.	edium dense; dark greeni to fine SAND; weak to stro t cemented nodules.	sn ing		SS- 11	45 46.5	6-10-14	24	18	14	31.1							Munsell dark greenish gray 10GY 4/1
			CL); hard; brown variegate little SAND; medium plas slow dilatancy; low toughr		-													000000000000000000000000000000000000000	
07.95	50		very dense; dark yellowis AY; medium SAND; frequ			MC- 12	50 51.5	9-21-31	52	18	13							000000000	PP: >5.0 tsf TV: 0.50 tsf
		blocky with SANDY C	LAY; subrounded.																
02.95	55	brown; moist; trace fir	ard; olive brown; moist; so	me		SS- 13	55 56.5	15-35-39	74	18	10.5							100000000000000000000000000000000000000	56.0', Grades from SP to
		SAND; medium plasti dilatancy; low toughne	city; low dry strength; slov ess.	V															ML
97.95	60	(continue	ed)															<u> </u>	
		(contains)	<del></del> /				E	REPORT BORING DIST.	3 R				ROUT	E	P	OSTM	IILE		HOLE ID S0030R EA
	C/ Hig	ALIFORNIA h-Speed Rail Autho	ority Caurowa Ho	ARLIP M-SHALL TO	NAPY.		(	PROJECT Californ BRIDGE N	ia H	igh-	Spe F	ed REF	Trair	D BY				DA1	TE SHEET 17-14 3 of 6

	ECT NA F <b>ornia</b> ED BY		n-Speed Train Fres BEGIN DATE	no to Bakersfield COMPLETION DATE	BORE	EHOL	LE L	OC/	ATION (L	at/Lo	ng oi	· Nor	th/Ea	ast an	d Da	tum)		1	OJEC 3157 OLE ID	
NG			Sep-10-13 ACTOR/DRILLER	Sep-11-13	N20	672	265.	.055	/ E635	0740	0.76	1 (N	NAD	83 C	ΑZ	4) ′		S	3003	
Greg	g Dril	ling/E	. Santellan					טאוו										2	57.95	5 ft (NAVD88)
	ING ME SER(0'		O MUD ROTARY(5'-1	01.5')	DRILL M-1			)											OREHO -7/8 i	DLE DIAMETER n
SAMPL	LER TY	YPE(S	) AND SIZE(S) (ID)	,	SPT H	HAMI	MEF	R TY	PE Ibs, 30	ina	h dr	<b></b>						HA		R EFFICIENCY, ERI
			T(1-3/8") FILL AND COMPLETIC	DN	GROU	JND	WA		DURING				AFT	ER D	RILL	NG (	DATE			DEPTH OF BORING
Neat	ceme	ent gr	out		READ	ING:	S		Not Re	cord	led		1	Not R		rded	ı	1	01.51	ft
Elevation (ft)	e Depth (ft)	Material Graphics		Description			Sample Number	Sample Depth (ft)	15-25-42	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests PP: >5.0, >5.0 ts
			moist; trace SAND; in	i; hard; dark yellowish bro idurated. ; very dense; light yellowis ines; fine SAND; weak			MC- 14	61.5	15-25-42	67	18	15.5				14 24.7	5.2			TV: 1.45 tsf
92.95	65			ery dense; dark yellowish l e SAND; weak cementatio			SS- 15	65 66.5	17-24-27	51	18	9.5							000000000000000000000000000000000000000	
37.95	70			; very stiff; dark yellowish ND; medium dry strength ess.			MC- 16	70	14-20-24	44	18	15		95.2	26.2	28	6.4			
			SILTY SAND (SM); m brown; moist; some fi cementation.	nedium dense; dark yellow ines; fine SAND; weak	rish			71.5												
82.95	75		- very dense; modera	te cementation.			SS- 17	75 76.42	18-36- 50/5"	86/11"	17	10							<u> </u>	
77.95			(continu	ed)															2000000	
								E	REPORT BORING	3 RI	ECC					1-				HOLE ID S0030R
		T. ACI		M	ADV				DIST.		UNT			ROUT	E	PO	OSTM	IILE		EA
	Н	igh-	LIFORNIA Speed Rail Autho	ority GALEGREER PO	AKUP GH-SHAD T	TEAR		(	ROJECT Californ RIDGE N	ia H	igh-	Spe F	ed REF		D BY				DAT 1-2	TE SHEET .7-14 4 of 6

Calif OGG		r nai <b>nia</b> I By		h <b>-Spee</b> B	<b>d Tra</b> i	in Fres	no to	Bakersfield MPLETION DATE	BORE	HOI	LE L	OCA	ATION (	Lat/Lo	ong o	r Nor	rth/Ea	ast ar	nd Da	tum)		1	1 <b>3157</b> OLE ID		
NG				;	Sep-1	0-13		ep-11-13	N20	672	265	.055	/ E63									5	3003	80R	
				ACTOR		ER			IN-SIT	U T	EST	ΓING												CE ELEVATION  5 ft (NAVD88	
DRILL	ING	ME	THO	D					DRILL															OLE DIAMETE	,
		•		MUD F 3) AND S		•	01.5')		M-10			-	DE									_	1-7/8 i	I <mark>n</mark> R EFFICIENCY	/ EDi
				PT(1-3/8		(ID)							r⊑ ) lbs, 3	0-inc	h dr	ор							4101101⊏1 35%	K EFFICIENC!	r, ERI
	НО	LE B	ACK	FILL AN		1PLETIC	N		GROU READI			TER				NG				,	•	1		DEPTH OF BC	RING
iveat	. Ce	inei	it gi	out						П	_		Not R	ecor	aea	Π	<u> </u>	NOL F	Reco	raea		<u> </u>	01.5		
Elevation (ft)	<b>⊜</b> ⊝Depth (ft)		Material Graphics				Descrip				Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remai Other T	
				- dens		no cem	entation	n; micaceous.			MC- 18	80 81.5	15-20-2	9 49	18	16									
72.95	85										SS- 19	85	13-22-2	4 46	18	7.5							MANAMA	Yellowish brow 5/4 10YR)	/n (Munse
										X		86.5					31.4		10.5						,
67.95	90				; wet; tr			ery dense; yellowis to medium SAND;	h														MANNAM		,
37.93	90									X	MC- 20	90 91.33	31-50- 50/4"	100	/ 16	14							MINIMAN	Yellowish brow 5/4 10YR)	n (Munse
	95					(SM); ves; fine		se; dark yellowish b	orown;														${\tt QQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQQ$		
62.95	95										SS- 21	95	15-46- 50/5"	96/	17	8	1								,
										X		96.42											MANDARDA		
				CLAYI with re	EY SAN eddish I	ND (SC) prown; v	; very de vet; son	ense; brown varieg ne fines; fine SAND	ated																
57.95 <b>-</b>	100		1///		(0	ontinu	ed)									1	1							l	
												E	REPORT BORIN DIST.	G R				ROUT	ΓE	P	OSTM	IILE		HOLE ID S0030R EA	
		C	A	LIFC Speed	ORI	NIA		LIRS HMM	ARLIP			P	ROJEC	T OF	BRI ligh	DGE	NAN	Æ Trai:	n					1	
			1	C	D . 1	A .L		7	-1911000	-		1	JalliUl	паг	ngi i	-opt	JUU	ııall	1						ET

NG  DRILLING CONTI Gregg Drilling/ DRILLING METHO AUGER(0'-5')	OD , MUD ROTARY(5'-101.5') S) AND SIZE(S) (ID)	DRILL RI M-10 (	TEST IG D44	.055 FING ) R TY	6 / E6350	0740	).76	1 (N						1 HC S SL 2 BC 4 HA	3157 DLE ID 3003 JRFAC 57.95 DREHI -7/8	OBOR BOR CE ELEVATION 5 ft (NAVD88) OLE DIAMETER	
BOREHOLE BAC Neat cement of	KFILL AND COMPLETION grout	GROUNI READING		TER	DURING Not Re			IG /			RILLII Recor			1	01.5	DEPTH OF BORING ft	
Elevation (ft)	Description	Sample Location	S Number	Sample Depth (ft)	90 Per Gin.	& N-Value (bl/ft)	⇔ Penetration (in)	G Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Off () Drilling Method	Remarks/ Other Tests No recovery in the MC shoe	
152.95 105	Borehole terminated at a deph of 101.5' on 9/11/2013.  See Borehole Log Legend for soil classificatio and key to test data and sampler type.	on chart		101.5													
	LIFORNIA -Speed Rail Authority	ARLIP HIGH-SHRID TRAN		E F	REPORT BORING DIST. PROJECT Californi BRIDGE N	CO OR ia Hi	BRIE	Y OGE I Spe	NAMI ed 7	E Frair AREI	n D BY	PC	OSTM	IILE	DA <sup>-</sup>	HOLE ID S0030R EA EA SHEET 27-14 6 of 6	

		High							TION (I									1;		<b>77-00</b>		-
NG/		ONITO	Aug-22-13 ACTOR/DRILLER	Aug-23-13		619	960.	.618	/ E635											31R	EVATION	
Gre	gg Dri	ling/E	E. Santellan		IIV-OII	0 1	LOI	IIIVG										20	60.0	5 ft (N	AVD88)	
	ING M		D MUD ROTARY(5'-81.5	')	DRILL M-10			.)											REF -7/8		IAMETER	
			) AND SIZE(S) (ID)	,	SPT F	HAM	MEF	R TYI													ICIENCY, ERI	
			T(1-3/8") FILL AND COMPLETION						lbs, 30			-	AFT		ו ו ווח	NC /I			5%	DEDTI	OF BORING	
	t ceme				READ			ILK	Not Re			NG			Reco		DATE	1	1.5 f		TOF BORING	'
Elevation (ft)	⇔ Depth (ft)	Material Graphics	Poorly graded SAND with brown; moist; medium SA	ND; little fine SAND;		SSS Sample Location	о д Sample Number	O Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	9 Penetration (in)	8 Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		Remarks/ Other Tests COMP, RV augered to 5.0'	
255.05	5		rounded to subrounded; [  SILTY SAND (SM); medit fine SAND; [NATIVE].	FILL).	t;	<u> </u>	SS- 02	5	2-5-6	11	18	15								FILL i	dentified; depth /E assumed 5.0	' <u> </u>
250.05	10		Poorly graded SAND (SP brown; moist; trace fines; subrounded; fine micaced	medium SAND; round			MC- 03	10	6-9-11	20	18	12	4.8		20.1							ASH - ON GHA - PRO
	15		Poorly graded SAND with dense; brown; moist; med		<u> </u>	<u>X</u>		11.5						93.3	16.9					TXCD		Kruc/cu/ku
245.05	15					$\exists$	SS-	15	3-6-6	12	18	15	-						100			=
245.05						X	04	16.5					5.9		19.6				000000000000000000000000000000000000000			
<b>-</b> 240.05↓	<b>–</b> 20 <b>––</b>	-1.1 14	(continued)			<u> </u>				-									u =1	1		$\neg$
									EPORT			יםט	`								LE ID	$\neg$
									BORIN DIST.		UNT			ROUT	E	PC	STM	IILE		EA	)031R	
			LIFORNIA Speed Rail Authority	LIRS HMM A	RUP	Trapy		(	ROJEC Califorr	nia H	igh-	Spe F	ed PREF	Trair PARE	D BY					TE	SHEET	
Щ													J. Ⅳ	lagg	1				1-	27-14	1 of 5	

NG/	SV		h-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE Aug-22-13 Aug-23-13	N20	619	960	.618	ATION (L 3 / E635	at/Lo 6336	ng oi 3.44	Nor 6 (N	th/Ea	st an 83 C	d Dat	um) <b>1</b> )		1: HC S	315 DLE II 003	31R		
Greg	gg Dri	lling/E	ACTOR/DRILLER E. Santellan	IN-SIT			ΓING	i 									2	60.0	CE ELE	AVD88)	
DRILL			MUD ROTARY(5'-81.5')	DRILL M-1			)											REF -7/8	IOLE DIA	METER	
			S) AND SIZE(S) (ID)	SPT F					) inc	h dr	n						HA	MME		CIENCY, ERI	
			PT(1-3/8") (FILL AND COMPLETION	1				bs, 30			-	AFTI	ER D	RILLII	NG (I	DATE		5% TAL	DEPTH	OF BORING	
Neat	cem	ent gr	rout	READ				Not Re						Recor			1	1.5 f	t		
Elevation (ft)	Depth (ft)	Material Graphics	Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		Remarks/ 0ther Tests	
			<ul> <li>grayish brown variegated with dark gray streatines; occasional roots (organics).</li> </ul>	aks; few		MC- 05	20	7-12-17	29	18	14								Occasi	onal root 1/4" ti	hick—
	25		Poorly graded SAND with SILT (SP-SM); medidense; grayish brown; moist; fine to medium S rounded to subrounded; micaceous.	 um 6AND;	<u>X</u>		21.5						99	14.0					DS		
235.05	25		SILTY SAND (SM); medium dense; grayish brovariegated with brown streaks; wet; fine SAND			SS- 06	25 26.5	5-10-12	22	18	9.5	7.2	91.6	18.2						uscovite flakes evious samples	NO.: HSR1
230.05	30					MC- 07	30 31.5	14-16-17	33	18	12	25.2	113.8	15.0							04/02/2014 - RFP
225.05	35		- dense; mottled brown with grayish brown and variegated with grayish streaks; moist; few fine medium to fine SAND; rounded to subrounded moderate to strong cementation; occuring in sand layers.	es; ;		SS- 08	35 36.5	25-25-19	44	18	6.5	24		14.0				<u>0000000000000000000000000000000000000</u>	Possibl soil stru	e calcite veins icture	in i
9 YE	=																				
220.05	40		(continued)															Ø			-=
			(continuou)				F	REPORT	TITL	E	,,,,								HOL		$\dashv$
								BORINO DIST.		UNT			OUT	E	PC	STM	IILE		EA	)31R	
	F	CA ligh-	LIFORNIA Speed Rail Authority	ARLIP 1001-SHALD T	WAF		(	PROJECT Californ BRIDGE N	ia H	igh-	Spe F	REP		O BY					TE 27-14	SHEET 2 of 5	

		gh-Speed Train Fres BEGIN DATE Aug-22-13	no to Bakersfield COMPLETION DATE Aug-23-13	BORE	HOI	LE L	.OC/	ATION (L 3 / E635	at/Lo	ong o	r Nor	th/Ea	ast an	nd Dai	tum)		<b>1</b>	<b>3157</b> DLE ID		R 	
ORILLI Greg	NG CONT	RACTOR/DRILLER /E. Santellan	Aug-20-10	IN-SIT	UT	EST				U. <del>44</del>	J (I	1/1/1/		<i>y</i>	7)		SL 2	60.05	E ELEVA 5 ft (NAV	D88)	_
	NG METH	OD , MUD ROTARY(5'-8	1.5')	DRILL M-10			)										- 1	)REHC 7/8 ii	DLE DIAMI n	ETER	
		S) AND SIZE(S) (ID)	- ,	SPT H	IAM	MEF	RTY										H/	AMMEF	R EFFICIE	NCY, ERi	
		PT(1-3/8") KFILL AND COMPLETIO	NI					) lbs, 30				AFT		י דווםי	NC /	DATE	1 -	35%	DEPTH OF	- DODING	.—
	cement o		IN	READ			IER	Not Re			NG			Reco			1	1.5 ft		BURING	
				•										(%)		(6					
Elevation (ft)	Depth (ft) Material Graphics		Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Re Oth	emarks/ er Tests	
		<ul> <li>dark yellowish brown subrounded.</li> </ul>	n; moist; fine SAND;			MC- 09	40	9-19-27	46	18	15							MM			-
		Poorly graded SAND (	SP); very dense; brown;		<b>/</b> \		41.5					26.9	101.6	8.6							-
15.05	45	trace fines; fine SAND	SP); very dense; brown; b; rounded to subrounded	moist, I.		SS- 10	45 46.5	13-23-28	51	18	9.5								Fine micad	ceous flake	S
10.05	50	SANDY SILTY CLAY yellowish brown; mois nodules.	(CL-ML); very stiff; dark t; occasional cemented			MC- 11	50	10-27-31	58	18	13										
		yellowish brown; mois subangular; occasiona nodules.  Poorly graded SAND (	with SILT (SP-SM); dense t; fine SAND; subrounder al moderately cemented (SP); dense; brown; mois	d to	M		51.5					13.6	105.8	7.0					DS		
05.05	55	trace fines; medium S subangular.	AND; subrounded to			SS- 12	55 56.5	10-19-20	39	18	10.5							<u> </u>			•
20.05		Poorly graded SAND v brown; wet; medium S	with SILT (SP-SM); dense SAND.	- — — — e;														1000000000000			
00.05	-0U	(continue	ed)																		
							E	REPORT BORING DIST.	3 R				ROUT	E	PC	DSTM	IILE		HOLE I S003 EA		
<b>7</b>	CA High	LIFORNIA -Speed Rail Autho	rity CALEDONA H	ARLIP	A.Fr		(	PROJECT Californ BRIDGE N	ia H	ligh-	Spe F	PREF	Trair	D BY				DAT 1-2		SHEET 3 of 5	

PROJE <b>Calif</b> LOGGE			n-Speed Train Fre	esno to Bakersfield COMPLETION DATE	BORE	EHO	LEI	OC/	ATION (L	at/Lo	na oi	· Nor	th/Ea	ast an	d Da	tum)		1	ROJEC <b>3157</b> DLE ID		_
NG/S	SV		Aug-22-13 ACTOR/DRILLER	Aug-23-13	N20	)619	960	.618	3 / E635	633	6.44	6 (1	NAD	83 C	A Z	4)		S	3003		
Greg	g Dril	lling/E	E. Santellan					IING										2	60.0	5 ft (NAVD88)	
	ING MI SER(0		D MUD ROTARY(5'-	81.5')	DRILI M-1			.)											)REH( -7/8 i	OLE DIAMETER In	
			) AND SIZE(S) (ID)	-	SPT I				PE ) lbs, 30	inc	h dr	nn.						H/		R EFFICIENCY, ERI	_
MC(2 BORE	2-1/2 HOLE	BACK	T(1-3/8") FILL AND COMPLETI	ON	GRO	UND	)WA		DURIN				AFT	ER D	RILLI	NG (	DATE			DEPTH OF BORING	
Neat	ceme	ent gr	out		READ	DING	S		Not Re	cord	ded		1	Not F		rded		8	1.5 ft	<u> </u>	_
Elevation (ft)	p Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests	
	=					V	MC- 13	60	14-25-27	52	18	15									=
95.05	65		- moist; few fines.				SS- 14	65 66.5	10-16-19	35	18	9.5	5.2	88.5					ogogogogogogogogogogogogogogogogogogog	DS	
90.05	70		moist; trace SAND; CLAYEY SAND (SC moist; little CLAY; m medium cementatio Poorly graded SAND	edium stiff; dark yellowish high plasticity; high toughr i); dense; dark yellowish b nedium SAND;; subrounde n. D (SP); dense; dark yellow fines; medium SAND.	rown; ed;	X	MC- 15	70	23-32-23	55	18	17								PP: 5.5 tsf TV: 0.30, 0.75 tsf	
85.05	75		SAND; low plasticity cementation.	M); hard; brown; moist; fin r, rapid dilatancy; weak O (SP); dense; grayish bro nedium SAND.		 T X 	SS- 16	75 76.5	14-22-30	52	18	10.5	50.4		22.5				000000000000000000000000000000000000000		
80.05	80		(contin						REPORT	TIT'										HOLEID	-
								E	REPORT BORING	3 R	ECC				_	1-	2071			HOLE ID S0031R	
		~ A =		N	1400				DIST.		UNT			ROUT	E	P	OSTM	IILE		EA	
	Н	JA ligh-	LIFORNIA Speed Rail Auth	ority CALECTRA	HQH-SHUD T	Trans		(	PROJECT Californ BRIDGE 1	ia H	igh-	Spe   F	REF		D BY				DA1	TE SHEET 27-14 4 of 5	

Californi		Spood Train F-	oene te Bel	korofiold													- 1		7 NOM	DEK	
	a mign Y	<b>I-Speed Train Fr</b> BEGIN DATE						ATION (L									HC	<b>3157</b> DLE ID	)		
NG/SV		Aug-22-13	Aug-2	3-13				3 / E635	6336	5.44	6 (N	IAD8	83 C	A Z4	1)			003			
		ACTOR/DRILLER Santellan			IN-SIT	U TES	STING	3												/ATION	
ORILLING M					DRILL	RIG													•	AVD88) AMETER	
		MUD ROTARY(5	'-81.5')		1	0 (D4	4)										1 -	-7/8 i			
		) AND SIZE(S) (ID)			SPT F												HA	MMEI		CIENCY, EF	₹i
MC(2-1/2	"), SP	T(1-3/8") FILL AND COMPLET	FION		1			0 lbs, 30			-	۸۲۲۲	ים ם:	יי דוום	NC /	747	- 1	5%	DEDTI	OE DODIN	<u></u>
Neat cem			ION		READ		AIER	Not Re			NG /			RILLII Lecor		JAIE	- 1	1.5 ft		OF BORIN	G
					+							ij					+ 5				
	hics					ion	€	۔		<del>ر</del>			(jo	Content (%)	(%)	Plasticity Index (%)		σ			
£ (	Material Graphics					Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	(in)	200 Wash (%)	Density (pcf)	Coni	Liquid Limit (%)	Inde	)	Drilling Method Casing Depth	-		
Elevation (ft)	rial (					ple L	be [	s pe	alue	strati	very	Nasl	Sens	ture	d Lir	icity	ğ O	D D	,		
Elev	Mate		Description			Sample	Sam	3Iow	-\-  -\-	ene	Recovery	2007	Dry [	Moisture	-igui	last	TXUU (psf)	Orillir		Remarks/ Other Tests	i
80			2 decempation			MC	C- 80				17.5	.,		_	_			~		J. 1. 0. 1. 0010	
						N 17												MMM			
						/\_	81.5	5										$\mathcal{Q}$			
5.05 85		Borehole terminate	ed at a depth o	of 81.5' on 8/23/	/2013.																
	1	Soil moisture indicate	ated as "wet" l	because sampl	les																
	1	became wet during drilling fluid. Soil n	noisture indica	ation should no	t be																
-	1	used as a definitive surface or free group			eatic																
= =	1																				
5.05 85	]	See Borehole Log and key to test data			chart																
		and key to test date	a anu sampiei	ιуρ∈.																	
	1																				
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5.05 95	1																				
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0.05 100																					
								REPORT BORING			טאט								HOL SO	E ID 031R	
								DIST.		UNT		R	OUT	E	PC	STM	ILE		EA	J J 111	
		LIFORNIA	Δ [	LIRS HMM	ARLIP		-	PROJECT	OR	BRIF	OGF I	 NAMI	E								
		Speed Rail Aut					1	Californ	ia H	igh-	Spe	ed T	Γrain					1-		Ta:	
	iigii-s	Peed Kull Mull	Horny	- AMERICAN PRO	The same of the			BRIDGE N	NUME	3ER	P	KEP/ ). M	AREI agg	i RA ר				DA1	ге 27-14	SHEET 5 of	5
													∽ઝઝ							J 01	-

California I		n-Speed Train Fresno to Bakersfield																77-00
LOGGED BY SV	gi	n-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE  Oct-23-13 Oct-24-13					ATION (L. 5 / E635									HC	DLE ID	)
	NTR	ACTOR/DRILLER	IN-SIT					319	.33	<i>i</i> (i	NAD	65 C	,A Z	4)				B3AR CE ELEVATION
Gregg Drillin																_		3 ft (NAVD88)
DRILLING MET AUGFR(0'		D MUD ROTARY(5'-151.5')	DRILL D-1 (													- 1	REH	OLE DIAMETER
•		) AND SIZE(S) (ID)	SPT H	AMN	ИEF													R EFFICIENCY, ERI
		, SPT(1-3/8")	1				) lbs, 30			•	^ <del></del>	<u></u>	- DII I	INO /	DATE		8%	DEDTH OF BODING
Neat cemer		FILL AND COMPLETION out	READI			IEK	DURING Not Re			NG				rded		1	01.5	DEPTH OF BORING ft
			-															
	hics			tion	þer	h (ft)	نے		(C			pcf)	Moisture Content (%)	(%	Plasticity Index (%)		_ ام	
Elevation (ft) Depth (ft)	Material Graphics			Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Density (pcf)	S	Liquid Limit (%)	/ Inde	sf)	Drilling Method	
Elevation Depth (ft)	erial			Sample	ble uple	nple	ws be	alue	etrat	over	Was	Den	sture	il bir	sticity	TXUU (psf)	ling N	Remarks/
Ele Deg	Mat	Description		_	_		Blo	ż				Dry		Lig	Plas	X	Ori	Other Tests
		SILTY SAND (SM); medium dense; dark yellow brown; dry; fine SAND; [FILL].	ish		B- 01	0			60	60	37.9		5.5				{	COMP, CORR, RV Hand augured to 5.0'
				202													{{	
				2007													$ \{] $	
				2000														-
		SILTY SAND (SM); medium dense; dark yellow		000														-
		brown mottled with reddish brown and grayish bdry; some fines; fine SAND; [NATIVE].	orown;	00														
255.53 5				200		5											}	
255.53 5				T	SS- 02	5	4-4-6	10	18	0								
						۰												
#				Н		6.5												-
										4.5	4-	110.5	100					0011 00
		- brown; moist.			U- 03	7.5			30	15	45	110.5	16.8					COLL, DS  Drill head down-feed
																		pressure (crowd) used to push Pitcher sampler, no
																		rotation
250.53 10		Poorly graded SAND (SP); medium dense; gray	 yish	Ħ		10.25											)))))	
<u> </u>		brown to brown; moist; trace fines; fine SAND; rounded.			ЛС- 04	10.5	6-8-9	17	18	12							)(U)	4
1 3:				H		12						95.3	6.7	-				1" rings used in MC sampler COLL, DS
						12											000	COLL, DO
<u> </u>		- brown to grayish brown.			SS- 05	12.5	3-5-6	11	18	11								=
				X		14												
																	)()	-
245.53					U	15			24	0							)()	No recovery - Pitcher
1 = 3:						10											<u> </u>	Sampler 15.0' - 17.0'
				Ц		17												
																	$\sim$	=
		- grayish brown.			ЛС- 06	18	9-16-22	38	18	12								1" rings, rings slid, 12" total recovery only 8" in
<del>     </del>				H		19.5						96.6	17.6	-				rings COLL, DS
240.53						10.5												
		(continued)																
							REPORT BORING			ים								HOLE ID S0033AR
						_	IST.		UNT		_	ROUT	E	PC	DSTM	1ILE		EA EA
( C	Δ	LIFORNIA LIRS HMM	ARLIP			F	ROJECT	OR	BRII	OGE	NAM	1E						
Hi	ah-	LIFORNIA Speed Rail Authority	an-Simple To	APV		(	Californ	ia H	igh-	Spe	ed	Traiı		,			D.4-	TE OUTET
	9.1.	opool Reli Adillolly					RIDGE N	NUIVII	DEK		кен <u>Ј. В</u>	orgh	D BY I <b>esi</b>				DA <sup>-</sup>	TE SHEET 27-14 1 of 6

Cali	fornia ED BY	Hial	n-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE  Oct-23-13 Oct-24-13					TION (L. / E635									<b>1</b>	<b>315</b> DLE I	77-00 D 33AR		
Gre		ling/[	ACTOR/DRILLER D. Heavilin D	IN-SITI			ĪNG										2	60.5	3 ft (N	EVATION AVD88) IAMETER	
AUG	BER(0	'-5'),	MUD ROTARY(5'-151.5')	D-1 (	(B5	3)												.0 in			
			s) AND SIZE(S) (ID) 5, SPT(1-3/8")	SPT H.				PE Ibs, 30	-incl	h dro	gc							AMME '8%	R EFFI	CIENCY, ER	
BORE	HOLE	BACK	FILL AND COMPLETION	I	IND'	WA		DURING	G DR	ILLIN							E) TC	TAL		OF BORING	3
Neat	ceme	ent gr	out	KEADI	ING.			Not Re	cord	led		1	Not F	Reco	rded		1	01.5	ft		-
Elevation (ft)	⊃Depth (ft)	Material Graphics	Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depin	Remarks/ Other Tests	
			- fine to medium SAND.			MC- 07	20	9-14-16	30	18	14							000			$\exists$
			Poorly graded SAND with SILT (SP-SM); mediun dense; grayish brown; moist; fine to medium SA rounded.			SS- 08	21.5	6-7-9	16	18	0	6	102.5	14.7					COLL	DS	
235.53	25		Poorly graded SAND (SP); medium dense; brow moist; trace fines; fine SAND.	 vn;		U- 09	24.5 24.5 26.25			21	14							1000000000000000000000000000000000000			
			- dense; grayish brown.			MC- 10	27.5 29	11-19-26	45	18	13		107.9	13.7					1" ring	ıs	
230.53	30	1111	- grayish brown with dark brown; fine to medium SAND.			SS- 11	30	8-9-46	55	18	18							MMM			
	$\exists$		SILTY SAND (SM); very dense; brown with dark brown seams; moist; some fines; fine SAND.	•			31.5											C = 1			<b>1</b>
			- grayish brown; trace cemented nodules <1/4" i diameter SANDY SILT (ML); very stiff; grayish brown	in 		U- 12	32			24	7.5							MMM			
	=		variegated with reddish brown; moist; little SANI fine SAND; low plasticity; low dry strength; low toughness.	D;			34														
225.53	35		- hard; weak cementation.			MC- 13	35	40-44- 50/5"	94/	17	16.5	-									
220.53	40						36.42						112.7	13.2				<u> </u>	DS		
_5.50	. •		(continued)																		
								EPORT BORING			DRD	)								LE ID 1033AR	
		TO AVI	HEODNII A				D	IST.	CC	UNT	Υ	F	ROUT	ΓE	PC	DSTM	IILE		EA		
	H	_A igh-	LIFORNIA Speed Rail Authority	H-SIMILE TIM	APV		(	ROJECT Californ RIDGE N	ia H	igh-	Spe   F	ed PREF	Trai PARE	D BY					·ΤΕ	SHEET	
											١,	J. B	orgh	esi				1-	27-14	2 of 6	

	ECT NAME <b>Fornia High</b> ED BY	h-Speed Train Fres BEGIN DATE	no to Bakersfield COMPLETION DATE	BORE	HOL	LE L	OCA	TION (L	at/Lo	ng oi	r Nor	th/Ea	ıst an	d Dat	um)		1	:OJEC <b>3157</b> DLE ID		_
SV		Oct-23-13	Oct-24-13		602	298.	.383	/ E635											3AR CE ELEVATION	
Greg	g Drilling/E	D. Heavilin															2	60.53	8 ft (NAVD88)	
	ING METHO SER(0'-5'),	บ MUD ROTARY(5'-1	51.5')	DRILL D-1													1 -	.0 in	OLE DIAMETER	
		S) AND SIZE(S) (ID)		SPT F					ina	h dr	on						HA	MME	R EFFICIENCY, ERI	_
		S, SPT(1-3/8") FILL AND COMPLETIO	N	1				lbs, 30			•	AFT	ER D	RILLI	NG (	DATE	- 1	'8% )TAL [	DEPTH OF BORING	
	cement gr			READ				Not Re					lot F				1	01.5		
Elevation (ft)	S Depth (ft) Material Graphics	ſ	Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
			cL); very stiff; grayish brow			SS- 14	41.5	19-17-24	41	18	10							000000000000000000000000000000000000000		-
15.53	45	variegated with reddis fine SAND; low plastic toughness.	h brown; moist; little SAN ity; low dry strength; low	υ;		MC- 15	45 46.5	14-17-22	39	18	15		103.1	13.8	24.2	8.7		000000000000000000000000000000000000000	PP: 2.0, 2.5, 3.5 tsf TV: 0.15 tsf	
10.53	50-	with reddish brown; m	very stiff; brown variegate loist; little SAND; fine SAN strength; low toughness.			SS- 16	50 51.5	10-13-15	28	18	11	82		21.0		NP		100000000000000000000000000000000000000	PP: 1.0, 0.5, 0.75 tsf	
05.53	55	Poorly graded SAND grayish brown; moist.	with SILT (SP-SM); dense	;		MC- 17	55 56.5	13-22-30	52	18	12	13.7	104	11.5				<u> </u>		
00.53	_60_	seams of brown, dark brown; moist; some fi			_															
		(continue	ea)				R	EPORT	TITI	E									HOLE ID	
							E	BORING DIST.	3 R				ROUT	E	PC	OSTM	ILE		S0033AR EA	
	CA High-	LIFORNIA Speed Rail Autho	rity CALSTONIAS HO	ARLIP M-SHAD TO	TAPE .		(	ROJECT Californ RIDGE 1	ia H	igh-	Spe	ed REF		D BY				DAT	TE SHEET 27-14 3 of 6	

<b>Calif</b> LOGG	ECT NAI <b>fornia I</b> ED BY		<b>-Speed Trai</b> BEGIN D	ATE	COMP	LETION DAT					TION (L									<b>1</b>	<b>3157</b> DLE ID		
Greg	gg Drillii	ng/D	Oct-23 ACTOR/DRILLE . Heavilin		Oct-	24-13	IN-SI	TU	TEST		/ E635	879	7.33	7 (N	NAD	83 C	:A Z	4)		SU 2	IRFAC 60.53	3AR E ELEVATION B ft (NAVD88)	
AUG SAMPI MC(2 BORE	LER TYF 2-1/2"),	5'), <b>I</b> PE(S) , PS, ACKE	MUD ROTAF AND SIZE(S) SPT(1-3/8") FILL AND COM	(ID)			1	HAN toma	53) MMER atic, DWA	140	lbs, 30	G DF	ILLIN	-		ER D				5 HA 7	.0 in MMEF '8%	DLE DIAMETER  REFFICIENCY, ERI  DEPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics		[	Descriptio	n		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
95.53	65		Poorly graded strong brown; subrounded to	I SAND ( moist; tr o rounde	(SP); den race fines d.	se; grayish bi s; fine SAND;			SS- 18	61.5	23-23-42	65	18	15							000000000000000000000000000000000000000	7-5YR 5/6	
90.53	70-		grayish brown	n; moist;	few fines	fine SAND.		X	SS- 20	70	17-21-27	48	18	10.5							>		
85.53	75		moist; trace fi	nes; fine	e to mediu	m ŠAŇD; rou		X	MC- 21	75 76.5	20-26-35	61	18	15							<u> </u>		
80.53	80		ŠAŃD; rounde			, inte to mear	um																-
										R	EPORT BORING	TITL G R	E ECC	ORD	)							HOLE ID S0033AR	
	C	Al gh-S	IFORN	VIA Autho	rity	LRS HM	M ARUP	THAP		P	ROJECT Californ	CC F OR ia H	BRII igh-	Y DGE Spe	NAMeed PREF		າ D BY		DSTM	ILE	DAT 1-2	EA	

<b>Calif</b> LOGG	ECT NA <b>fornia</b> ED BY			completion DATE					TION (L									<b>1</b> ;	<b>31577</b> DLE ID		_
Greg	gg Drill	ling/D	Oct-23-13 ACTOR/DRILLER  D. Heavilin	Oct-24-13	IN-SIT	TU T	ΓEST		/ E635	0/9	1.33	/ (I\	NAD	o3 (	JA Z	+)		SU 26	60.53	E ELEVATION ft (NAVD88)	_
AUG SAMPL MC(2 BORE	LER TY 2-1/2"	'-5'), I (PE(S ), PS BACKI	MUD ROTARY(5'-1 ) AND SIZE(S) (ID) i, SPT(1-3/8") FILL AND COMPLETIC	·		(B: HAM Oma	53) MMER atic, DWA	140	PE Ibs, 30 DURING Not Re	G DF	RILLIN				RILL			5. HA 78	.0 in .MMER 8%	EFFICIENCY, ERI	
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
175.53	85		Poorly graded SAND brown; moist; fine SA	(SP); very dense; grayish ND; micaceous.			MC- 23	81.5 85 86.42	13-17-21 29-42- 50/5"	92/ 11"		15							<u> </u>		
170.53	90-		moist; fine SAND.	ery dense; dark yellowish b			SS- 24	90 91	31-50/6"	50/6"	12		30.4		11.7						
165.53	95			few to little fines; fine SAI		X	MC- 25	95 95.92	39-50/5"	50/5"	11	11							000000000000000000000000000000000000000		
160.53 <sup>L</sup>	100	111	(continu	ed)						<u> </u>		I		<u> </u>			1				_
								E	EPORT BORING IST.	GR				ROUT	E	PO	DSTM	ILE		HOLE ID S0033AR EA	
	Н	A igh-	LIFORNIA Speed Rail Autho	Drity CALIFORNIA PO	ARLIP 24-SHALD TO	TEASY			ROJECT Californ RIDGE I	ia H	ligh-	Spe P	ed REF	Traiı	D BY				DAT 1-2	E SHEET 7-14 5 of 6	

Colifor			to Dakorofield															7 00	BEK	
LOGGE	rnia r DBY	High-Speed Train Fresno BEGIN DATE (	COMPLETION DATE	BORE	HOL	E LO	CATION (I	at/Lo	ng or	r Nort	th/Ea	st an	d Dat	um)		HC	<b>3157</b> DLE ID	<b>7-00</b>		
SV		Oct-23-13	Oct-24-13				33 / E635									S	003	3AR		
		NTRACTOR/DRILLER		IN-SIT	U TE	ESTIN	IG												/ATION	
		ng/D. Heavilin																•	AVD88)	
DRILLING			<b>F</b> I\	DRILL												1 -		OLE DIA	METER	
		5'), MUD ROTARY(5'-151.	5)	D-1 (	`		N/DE									_	.0 in	D EEE/	NENOV ED	<del>.</del>
		PE(S) AND SIZE(S) (ID) , PS, SPT(1-3/8")		SPT H.			40 lbs, 30	)-incl	h dr	on						- 1	NVIIVIEI '8%	REFFIC	CIENCY, ER	a
BORFHO	OLE B/	ACKFILL AND COMPLETION		1			R DURIN				AFTI	FR D	RILLI	NG (I	DATE	- 1		DEPTH	OF BORIN	G
		nt grout		READI			Not R						Recor			- 1	01.5			_
				-																
		S			L.	<u></u>	3					£ (	Moisture Content (%)	(	Plasticity Index (%)					
£	-	Material Graphics			Location	Sample Number	Blows per 6 in.	Œ	Penetration (in)	(in)	(%)	Density (pcf)	onte	Liquid Limit (%)	(apc	_	Drilling Method Casing Depth			
io (	€ 6	Ō ■			의	<u> </u>	i je	e (p	atio	ery (	ash	nsit	9 O	Limi	ity	(psf	N N			
Elevation (ft)	Depth (ft)	terio			Sample	g d	SW.	N-Value (bl/ft)	netra	Recovery	200 Wash (%)	, De	istu	nid	stic	TXUU (psf)	Drilling Metho Casing Depth	9	Remarks/	
<u><u> </u></u>	<u>Ö</u> :	∑ Des	cription			_					200	Dry	Мо	Liq	Pla	ĭ	Ö Ö	(	Other Tests	
					5	SS- 10 26	00 21-27-29	56	18	8.5										
	3				М												MMM			
	=				Λ	10	1.5										$\otimes$			
155.53 108	=	Borehole terminated at a	depth of 101.5' on																	
	Ξ	8/23/2013.																		
	$\equiv$	Soil moisture indicated as became wet during retriev	s "wet" because sam	ples																•
	Ⅎ	drilling fluid. Soil moistur	e indication should n	ot be																
	$\exists$	used as a definitive indica surface or free groundwa		reatic																
155.53 10	5—	_																		
	` <u> </u>	6" liners used with the MO nothed in the Remarks.	C sampler unless oth	erwise																
	=	notice in the remaine.																		
		See Borehole Log Legend	d for soil classificatio	n chart																
	=	and key to test data and s	ampler type.																	
	$\exists$																			
	$\equiv$																			•
150.53 110	0																			
150.53 110	=																			-
	=																			
	$\exists$																			
	=																			
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	$\exists$																			
140.53-120	20																			
							REPORT											HOL		_
							BORIN					OL IT	_	DC	OTA 4				033AR	
							DIST.	00	UNT	T		ROUT	_	1 PC	STM	ILE		EA		
	C	ALIFORNIA	LIRS HMM	ARUP			PROJEC	T OR	BRI	OGE	NAM	E .		1						
		gh-Speed Rail Authority	CALFORNA	HOM-SHALL THE	APV		Califorr					Trair PAREI					DAT	re	SHEET	
		o processing the state of the s					חטויום	IVIOIVI	ンニバ		J. Bo	orgh	esi				1-2	1⊏ 27-14	6 of 6	ô
												· · ·								

NG	<b>fornia</b> ED BY	High	n <b>-Speed Train Fresr</b> BEGIN DATE Aug-28-13	no to Bakersfield COMPLETION DATE Aug-29-13	BOREH N2056			ATION (L ) / E636									H 5	1 <b>315</b> 7 OLE II 3003	34BR	
Greg DRILLI	gg Dri ING M	lling/E ETHO			IN-SITU DRILL R	lG											B(	260.3 DREH	CE ELEVATION 9 ft (NAVD88) IOLE DIAMETER	
SAMPI	LER T' 2-1/2' HOLE	YPE(S '), SP BACK	MUD ROTARY(5'-10)  AND SIZE(S) (ID)  T(1-3/8")  FILL AND COMPLETION  out			MME natic	R TY	) lbs, 30	G DR	ILLIN	-			RILL			H/ 8	35%	ER EFFICIENCY,	
Elevation (ft)	Depth (ft)	Material Graphics	D	escription	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks Other Tes	
255.39	5		medium SAND; subang micaceous; occasional oxidation/alteration street medium SAND; subang micaceous; occasional oxidation/alteration street micaceous; occasional oxidation/alteration street micaceous; occasional oxidation	ith SILT (SP-SM); mediu	st;	B-01 SS: 02	5 5	3-6-6	12	18	12	49							CBR, COMP, RV Hand augered to	
50.39	10		subangular; micaceous	nedium SAND; subrounde s.		MC 03		4-9-10	19	18	11	8	102.4 92.7	20.1				<u> </u>	DS	
45.39	15		- few fines.			SS- 04		5-11-12	23	18	9.5							<u> </u>		
240.39	20		Poorly graded SAND (5 brown; trace fines; sub micaceous.	SP); medium dense; grayi angular to subrounded;	 ish															-
-			(continue	d)			-	REPORT	TITI	F									HOLE ID	
O	<b>(</b>	CA	LIFORNIA	URS HMM A	RUP		E	BORING DIST. PROJECT	G RI CO	ECC UNT BRII	Y DGE I	NAI/			PO	OSTM	IILE		S0034BR EA	
	Н	ligh-	LIFORNIA Speed Rail Author	CALSTONYS HO	H-SPAED TRAP			Californ BRIDGE 1			P	REP		D BY				DA 1-2	TE SHEE 27-14 1 o	

NG DRILLI	iornia ED BY	High ONTR	n-Speed Train Fresi BEGIN DATE Aug-28-13 ACTOR/DRILLER	no to Bakersfield COMPLETION DATE Aug-29-13		564	443	.189	ATION (L / E636									HC S	3157 DLE ID 3003 JRFAC	4BR E ELEVATION	_
DRILLI AUG SAMPI MC(2 BOREI	ING MI BER(0 LER T' 2-1/2' HOLE	ETHOI 1'-5'), I YPE(S '), SP	MUD ROTARY(5'-10 ) AND SIZE(S) (ID) T(1-3/8") FILL AND COMPLETIO			O (I HAM Oma	D44 IMER atic,	7 TYI 140	lbs, 30	G DF	RILLIN	•		ER D	Reco			BC 4 HA 8	REHO -7/8 ii MMEF 55%	R EFFICIENCY, ERI	
Elevation (ft)	ն Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	25					X	MC- 05	21.5	9-12-17	29	18	13		96.3	5.2					DS	
235.39	30		grayish brown variega	with GRAVEL (CL-ML); ha ted with reddish brown an ND; low plasticity; modera	id		SS- 06	25 26.5	6-12-11 27-50-53	103		9.5							000000000000000000000000000000000000000	Possible calcite veins	
25.39	35			SP); dense; dark yellowisl es; fine SAND; moderate 1/8".			07 SS- 08	31.5	11-14-18	32	18	10	54	115.8	15.5	24	4		000000000000000000000000000000000000000	Possible calcite veins Caliche? Hard pan lay appears to have clay a silt.  Possible calcite veins	
20.39	40		with reddish brown an grades to medium SA	rd; grayish brown variegard gray; some SAND; fine ND; weak cementation; the equent light gray cementard)	inly			36.5													
		~ A I		URS HMM A	ARI IP			E	REPORT BORIN DIST.	GR	EC(	Υ	F	ROUT	E	PO	OSTM	IILE		HOLE ID S0034BR EA	
	H	JA ligh-	LIFORNIA Speed Rail Autho	rity CALIFORNIA MG	H-SIMAL TO	VAPE			ROJEC Californ RIDGE	ia H	ligh-	Spe	ed PREF		D BY				DAT 1-2	E SHEET 77-14 2 of 6	

	ECT N. <b>fornia</b> ED BY		h-Speed Train Fres BEGIN DATE	no to Bakersfield COMPLETION DATE	BORE	EHO	LE I	_OCA	TION (L	at/Lo	ng oi	· Nor	th/Ea	ast ar	nd Da	tum)		1	3157 OLE ID	
NG DRILLI	ING C	ONTR	Aug-28-13 ACTOR/DRILLER E. Santellan	Aug-29-13		)564	443	.189	/ E636									SL	JRFAC	S4BR CE ELEVATION Oft (NAVD88)
DRILLI AUG SAMPL	ING MI BER(0 LER T	ETHO '-5'), YPE(S	D MUD ROTARY(5'-1 B) AND SIZE(S) (ID)	00.8')	DRILL M-1	I) 0 NAF	D44 IME	R TYI		ina	h als.							80 4	OREHO -7/8 i AMMEI	OLE DIAMETER
BORE	2-1/2' HOLE ceme	BACK	PT(1-3/8") (FILL AND COMPLETIO COUT	N		JNE	)WA	TER	Ibs, 30 DURING Not Re	G DR	RILLIN	-			Reco			) TC	35% DTAL I 00.8	DEPTH OF BORING ft
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
	-40 		seams.			X	MC- 09	40 41.42	19-36- 50/5"	86/	17	12	50.5							
15.39	45		dark yellowish brown; SAND; low plasticity; I	IL); hard; brown variegate moist; little GRAVEL; few ow dry strength; rapid weak cementation; frequ	V	T X	SS- 10	45 46.5	12-28-24	52	18	12	69							Retained 6" of SPT sampler - mostly silt, possible calcite cementation
10.39	50		plasticity; low dry strer	rd; grayish brown; moist; ngth; rapid dilatancy; low nodules 1/4" - 1/2" in dian		X	MC- 11	50	12-18-34	52	18	18	64	102.4	21.9				$\overline{0}$	
			SILTY SAND (SM); de fines; weak cementation	ense; grayish brown; some on.	- — — - e			51.5												Grading becomes mor sandy
05.39	55		- moist; little fines; fine	e SAND.  hard; grayish brown variette SAND; weak cementa	egated	X	SS- 12	55 56.5	15-20-21	41	18	8							000000000000000000000000000000000000000	
00.39	60		(continue																00000000	
									EPORT			ORD	)							HOLE ID S0034BR
	Н	CA ligh-	LIFORNIA Speed Rail Autho	rity Cauthers to	ARLIP GH - SHEED T	TOAP		P	ROJECT Californ RIDGE N	CO OR ia H	BRII	Y DGE Spe	NAMeed PREF	Traiı	n D BY		OSTM	IILE	DAT	EA

Cali LOGG NG DRILL Gree DRILL AUG SAMF	ING CON gg Drilling ING METH GER(0'-5 LER TYPE (2-1/2"),	igh-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE Aug-28-13 Aug-29-13  TRACTOR/DRILLER g/E. Santellan HOD '), MUD ROTARY(5'-100.8')  E(S) AND SIZE(S) (ID)  SPT(1-3/8")  CKFILL AND COMPLETION	BOREHOLE N205644: IN-SITU TES DRILL RIG M-10 (D4 SPT HAMME Automatic GROUNDW READINGS	3.189 STING 4) ER TY c, 140	9 / E636	5000 -inch	n dro	9 (N	AFTE	83 C	CA Z	1) NG (l	DATE	13 HC S SU 20 BO 4- HA 8	3157 DLE ID 003 RFAC 60.39 REHC -7/8 in MMEF 5%	4BR EE ELEVATION OF (NAVD88) DLE DIAMETER OR REFFICIENCY, ERI	
Elevation (ft)	Depth (ft)	Description	☐ Sample Location		Blows per 6 in.	% N-Value (bl/ft)	2 Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR F-B R	70-	SILTY SAND (SM); very dense; brown variegated reddish brown and grayish brown; moist; fine SALS SAND with SILT (SP-SM); dense; brown; moist; fines; medium to fine SAND; moderate cementated SILT with SAND (ML); hard; dark yellowish brown moist; fine SAND; non plastic; weak cementation	I with ND.  SS 14	61.42	12-26-27 17-18-23	53	18	8	75 39	110.3	19.8		NP NP		$\overline{a}$	Variegated between 65. and 66.1'	04/02/2014 - RFP No.: HSR13-57
180.39	80	(continued)	1-1	1.	DEDORT	TIT! !										HOLEID	
1.0.3A BOREHOLE LOG	C/ Hig	ALIFORNIA h-Speed Rail Authority	CHALL TRAP	E F (	REPORT BORING DIST. PROJECT Californi BRIDGE N	COI OR I	BRID	Y OGE N Spe	NAM ed REP		า D BY	PC	OSTM	IILE	DAT 1-2	HOLE ID S0034BR EA SHEET 7-14 4 of 6	

	ECT N. Fornia ED BY		<b>1-Speed Train Fres</b> BEGIN DATE	sno to Bakersfield COMPLETION DATE	BORE	НО	LE L	_OC/	ATION (L	at/Lo	ng oi	· Nor	th/Ea	ast an	d Da	tum)		1	31577 OLE ID	T NUMBER <b>7-00</b>	_
NG DRILLI	ING C	ONTR	Aug-28-13 ACTOR/DRILLER E. Santellan	Aug-29-13		564	443	.189	/ E636									SL		E ELEVATION	
DRILLI	ING M	ETHO		00.8')	DRILL M-10			.)										BC		ft (NAVD88) DLE DIAMETER	
MC(2 BORE	2-1/2'	'), SP BACK	o) AND SIZE(S) (ID) PT(1-3/8") FILL AND COMPLETIC Out	NO		JNE	atic, OWA	140	lbs, 30	G DR	ILLIN	-		ER D				8 TC	35%	R EFFICIENCY, ERI DEPTH OF BORING t	
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	-80		brown; moist; some f	very dense; dark yellowish ines; moderate cementation	n. 	X	MC-	80 80.83	36-50/4"	50/ 4"	10	10									
75.39	85			ense; grayish brown; moist; D; weak cementation.	;	X	SS- 18	85 86.5	17-20-19	39	18	7.5							<u> </u>		
70.39	90		Poorly graded SAND brown; moist; trace fi micaceous.	(SP); very dense; grayish nes; medium SAND;		X	MC- 19	90	23-25-31	56	18	16									
65.39	95		variegated with brown fines; fine SAND; wea Poorly graded SAND brown variegated thro	dense; grayish brown and light gray; moist; som ak cementation.  (SP); very dense; dark yelloughout with reddish brown; to medium SAND; weak	 owish		SS-	91.5	15-28-32	60	18	12.5							$\sim$		
			SANDY CLAY (CL); I some fine SAND; me	nard; grayish brown; moist; dium plasticity; high dry			20	96.5	10-20-02	30	10	12.0							<u> </u>		
60.39 <b></b>	100	VIII	(continu	ed)					ı												
								E	REPORT BORING DIST.	3 R				ROUT	E	PC	OSTM	IILE		HOLE ID S0034BR EA	_
<b>7</b>	H	CA ligh-	LIFORNIA Speed Rail Autho	Drify Cast Days Man	RLP -BIND TO	PAPI		(	PROJECT Californ BRIDGE N	ia H	igh-	Spe	ed		D BY				DAT 1-2	E SHEET 7-14 5 of 6	_

DRILLII AUG SAMPL MC(2 BOREH	Ornia ED BY NG CC g Drill NG ME ER(0' LER TY 2-1/2"	High  ONTRA  Ing/E  THOE  -5'), M  (PE(S)  ), SP  BACKE	CTORA Sante MUD F AND S F(1-3/8	Aug-2 /DRILL ellan ROTA SIZE(S	28-10 LER ARY(10)	5'-10	Au 00.8')	ug-2			TE	DRILLI M-1 SPT I Auto	D56- TU T L RIII IO (I HAM OME	G D44 MME atic,	3.189 TING 4) R TY , 140	) / E6	365	5000 -inch	).84 n dro	3 (I op	NAD	83 (	CA Z	4)	DATI	1 HO S S L 2 B C 4 H A 8	315 OLE 300 JRF/260.3 OREI 1-7/8 AMM 35%	77-0 ID 34E 39 ft HOLE 3 in ER E	BR ELEV/ (NA) E DIAM	ATION VD88) METER ENCY,	ERi	
Neat	ceme	Ĭ	out									READ			£	Not	Red	cord	ed		1		Reco (%)	rded		1	3.00					
Elevation (ft)	S Depth (ft)	Material Graphics	streng	th; fas	st dila		escrij			ness			Sample Location	ਤੂ Sample	Sample Depth (ft)	Blows per 6 in.		S N-Value (bl/ft)	ω Penetration (in)	ω Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	∬ Drilling Method	Casing Depth		Remark ther Te		
		<u>/////////////////////////////////////</u>	Boreho 8/29/2	ole ter										21	100.7			3"									000					
155.39 1 150.39 1	105		See Be and ke	orehol	de Loç	g Lege ata and	end fo	or soil	il clas	ssifica	ation o	chart																				
	110																															
145.39 1																																
			.IFC				rity	1	LIR	RS   HM	MM   Al	RLIP	THAN		E F	REPOR BORI DIST. PROJE Califo	NG ECT ornia	OR a Hi	ECC UNT BRII igh-	Y DGE Spe	NAM eed	Trai PARE	n :D BY		OSTN	/IILE	D/ 1		EA	SHEE 6 0	ī	

Cali LOGG	fornia H SED BY	⁄⊪ ligh	- <b>Speed Train Fresn</b> e BEGIN DATE	COMPLETION DATE					ATION (L							um)		1:		<b>77-00</b>	————	
NG	ING CON	ITDA	Oct-17-13 ACTOR/DRILLER	Oct-18-13	N19				/ E640	5122	2.9	(NA	D83	CA	Z4)					SSR DE ELEV	/ΔΤΙΩΝ	
Gre	gg Drillir	ng/D	. McMackin					IIIVG										1	93.8	1 ft (NA	VD88)	
	.ING MET SER(0'-!		) MUD ROTARY(5'-10 <sup>.</sup>	1.5')	DRILL D-1														REH in	OLE DIA	METER	
			) AND SIZE(S) (ID)	,	SPT I	HAM	MEF											НА	MME	R EFFIC	IENCY, ERI	
			, SPT(1-3/8") FILL AND COMPLETION		1				DURING			•	AFT	FR D	RILLI	NG (I	DATE		8% TAI	DEPTH (	OF BORING	
	t cemen				READ				Not Re						Recor	-	37 (T.E.	1	01.5		51 BOT 1110	
Elevation (ft)	Depth (ft)	Material Graphics		escription		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		Remarks/ other Tests	
			SILTY SAND with GRA' some FINES; fine SANI to subangular; [FILL].	D; little GRAVEL; subrou	unded	000000000	B- 01	0			60	60							2222	COMP, Hand au	RV ugered to 5.0'	bgs
188.81	5		CLAYEY SAND with GF brown; moist; some fine surounded to subangula SILTY SAND (SM); met some fines; medium SA	es; fine SAND; few GRA ar. dium dense; dark brown	; dry;	000000	MC- 02	5	3-11-10	21	18	12								Asphalt cobbles materia	gravel and in the slough	ed
ABASE.GLB 1/27/14			subrounded.  SILTY SAND (SM); med dry; little fines; fine SAN	ID; micaceous [NATIVE	].	X		6.5						101.1	9.1					DS "Beach		KFP No.: HSR1
MASTER DAT 183.81	10		Poorly graded SAND wi dense; grayish brown; n medium SAND; micace	noist; few fines; fine to	im		SS- 03	10	8-13-11	24	18	9.5										_ <b>_</b>
1.0.3.4 BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  1.0.3.4 BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  1.0.3.4 BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14								11.5					8.6		9.8							4/02/2014
DOTR LIBRARY_MAST	15—		- trace fines; medium S micaceous.	AND; subrounded;		X	MC- 04	15	10-15-23	38	18	12	9.5	108.1	15.9				<u> </u>	DS		
17 F-8 REV ARUP 173.81	20		Poorly graded SAND wi dense; grayish brown; n			_													DODDODDOD			
- CHS			(continued	1)				1 -	LEDOST	T.T.	_									1000	- ID	_
50 <u>1</u>								E	REPORT BORING	3 RI	ECC					1 -				_	65R	
HOLE		A 1	IEODY II A	D					DIST.		UNT			ROUT	E	PC	STM	IILE		EA		
0.34 BORE	Hiç	AL ph-S	LIFORNIA Speed Rail Authori	CALETHRA PAC	ARLIP BH-SHIED T	TIARI		(	ROJECT Californ BRIDGE N	ia H	igh-	Spe	ed REF		D BY				DA <sup>-</sup>	TE 27-14	SHEET 1 of 6	-
													۱۷ . ر	ıayy	1				1 -4	_ / ~ 1 <del>*†</del>	1 0 0	

PROJE <b>Calif</b> LOGG NG	forni	a High	n-Speed Train Fres BEGIN DATE Oct-17-13	sno to Bakersfield COMPLETION DATE Oct-18-13					ATION (L 7 / E640							tum)		<b>1</b>	3157 3157 DLE ID	)
DRILLI	gg Dr		ACTOR/DRILLER  D. McMackin	20. 10 10	IN-SIT	TU 7	ΓES			J 12		\. • · · ·		J, (	— · /			SL 1	JRFAC 93.8	DE ELEVATION  1 ft (NAVD88)  OLE DIAMETER
AUG SAMPI MC(2 BORE	ER(( LER T 2-1/2 HOLE	0'-5'), YPE(S	MUD ROTARY(5'' S) AND SIZE(S) (ID) S, SPT(1-3/8") FILL AND COMPLETIC	·	D-1 SPT I	(B: HAM oma	53) MMER atic, DWA	140	lbs, 30	G DF	RILLIN	•			Reco			5 HA 7	in AMMEI '8%	R EFFICIENCY, ERI
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
	-20            					X	SS- 05	21.5	8-11-13	24	18	10	10.5		13.3				0	
68.81	25		coarse SAND; subro			X	MC- 06	25 26.5	8-10-10	20	18	17	14.6	114	15.3				aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa	Munsell color 25Y 4/2
63.81	30		moist; little grades to micaceous.	nedium dense; grayish bro some fines; medium SAN ND (CL-ML); soft to stiff; g n dark reddish brown; moi SAND; fine SAND.	ID; grayish		SS- 07	30	6-4-10	14	18	14.5							20	Soft - 1 blow/3" 30.7' - 30.9' Weak cementation
58.81	35			(CL); medium stiff, olive b fine SAND; medium dry str			MC- 08	35	5-5-7	12	18	11.5		110.6	20.9	31	17		000000000000000000000000000000000000000	PP: 2.75 tsf TV: 0.40 tsf
53.81	40		brown; moist; some s high dry strength; slo	,	ive sticity;														10000000000000000000000000000000000000	
			(continu	lea)				l R	REPORT	TITI	E.									HOLE ID
		<b>~</b>	UEODE !! 4					E	BORIN DIST.	GR	ECC	Υ	F	ROUT	E	P	OSTM	IILE		S0065R EA
	H	JA High-	LIFORNIA Speed Rail Autho	ority CALECTRICA HO	ARUP GH-SHADOT	TVAPV			PROJECT Californ BRIDGE I	ia H	igh-	Spe P	ed REP	Trair	D BY				DA1	TE SHEET 27-14 2 of 6

<b>Calif</b> .oggi NG	<b>fornia Higl</b> ED BY	h-Speed Train Fres BEGIN DATE Oct-17-13	no to Bakersfield COMPLETION DATE Oct-18-13					ATION (L							tum)		H	3157 DLE ID 3006	)	
Greg		ACTOR/DRILLER D. McMackin		IN-SIT			ING										SL 1	JRFAC 93.81	CE ELEVATION  1 ft (NAVD88)  DLE DIAMETER	
AUG	SER(0'-5'),	MUD ROTARY(5'-1	01.5')	D-1	(B5	3)											5	in	-	
		S) AND SIZE(S) (ID) S, SPT(1-3/8")		SPT F				PE ) lbs, 30	-inc	h dr	าท							AMMEF '8%	R EFFICIENCY, ER	i
NIC(2 BORE	HOLE BACK	FILL AND COMPLETIO	N	GROL	JND	WA						AFT	ER D	RILLI	NG (	DATE	- 1		DEPTH OF BORING	3
Neat	cement gr	out		READ	ING	S		Not Re	cord	led		١	Not F		rded		1	01.51	ft	
ation (ft)	Depth (ft) Material Graphics				Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	J (psf)	g Method g Depth		
Elevation	Depth (ft) Material G	Г	Description		samp	samp	samp	Slows	I-Val	ene	Reco	200 V	Ory D	Noist	iquic-	Jasti	TXUU (	Drilling I	Remarks/ Other Tests	
	40 40	SANDY LEAN CLAY (	CL); medium stiff; dark t; some SAND; fine SANI	- — — — D; high		SS- 09	41.5	3-3-3	6	18	14			~	32	19	L		Downward thrust 256 PP: 3.5 tsf  CONSOL Shelby tube	) psi
48.81	45		ff; dark yellowish brown; r ID; no plasticity; medium cy; low toughness.			MC- 11	44.5 45 46.5	2-10-10	20	18	18				29.9	3.7		<u> </u>	PP: 1.7 tsf TV: 0.56 tsf	
¥3.81	50	SILTY SAND (SM); me some fines; fine SAND	edium dense; brown; moi ).			SS- 12	50	7-9-9	18	18	10							<u>OODDOODDOODDOODDOODDOODDOO</u>		
38.81	55		SP); very dense; dark gra les; fine SAND; subround			MC- 13	51.5 55 56.5	27-40-42	82	18	16.5	3.9	109	17.6				<u> </u>		
33.81	60	gray; moist; some SAI	L); very stiff; dark greenis ND; fine SAND; high plasi lilatancy; high toughness.	ticity;																•
		100.101100	,				R	REPORT	TITL	E									HOLE ID	
							E	BORING DIST.	3 RI				ROUT	E	PC	DSTM	IILE		S0065R EA	
	CA High-	LIFORNIA Speed Rail Autho	rity CALETERPA PE	ARUP GH-SHARD TI	TAPE		(	ROJECT Californ RIDGE N	ia H	igh-	Spe F	ed REF		D BY				DAT 1-2	TE SHEET 27-14 3 of 6	

Calif LOGG NG		High	Oc	t-17-13	no to Bake COMPLET Oct-18-		N19	059	926.	007	TION (L / E640							tum)		HC S	3157 DLE ID 3006	55R
Greg DRILLI	gg Dril ING ME	ling/E			01.5')		DRILL D-1	RIC	3	ING										1 BC	93.81	CE ELEVATION  I ft (NAVD88)  DLE DIAMETER
SAMPL MC(2 BORE	LER T\ 2-1/2"	YPE(S '), PS BACK	) AND SIZE 5, SPT(1-3 FILL AND (	(S) (ID)	<u> </u>		SPT F	IAM oma	MEF itic,	140 TER	lbs, 30	G DR	ILLIN	•		ER D	Recor			HA 7	MMEF '8%	R EFFICIENCY, ERI DEPTH OF BORING ft
Elevation (ft)	Depth (ft)	Material Graphics		ı	Description				Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
			variegate	d with reddis	(SP); dense; h brown and AND; fine to	gray with light gray, moist; ti coarse.	t gray race		SS- 14	61.5	8-8-11	19	18	10.5							000000000000000000000000000000000000000	Maxes out pocket pen 3 times PP: >5.0 tsf  Munsell color GLEY1
28.81	65								MC- 15	65 66.5	31-33-30	63	18	14							100000000000000000000000000000000000000	Gray veins react vigorously to HCL
23.81	70					lored layers o some fines; fi			SS- 16	70 71.5	10-13-19	32	18	10								1-inch thick layer of medium grained SANI
18.81	75		SANDY S SAND; m	IILT (ML); ha	ord; dark gray	some SAND	); fine		MC- 17	75 76.5	18-27-28	55	18	16		104.2	21.8		NP		<u> </u>	Rich in biotite
13.81				(continu	ed)					P	EPORT	           	F									HOLE ID
(Z	<b>(</b>	CAI	LIFOI	RNIA	Ţ	URS HMM A	RUP			D P	BORIN IST. ROJEC	G RI CC	ECC UNT BRII	Y DGE	NAM			PC	OSTM	ILE		S0065R EA
	Н	igh-	Speed R	ail Autho	rity =	CALIFORNIA HO	H-SHARD TI	VAPV			Californ RIDGE I			ĪР	REP	Trair AREI lagg	O BY				DAT 1-2	SHEET 27-14 4 of 6

Cali	fornia Higl GED BY	n-Speed Train Fresno to Bak BEGIN DATE COMPLE	K <b>ersfield</b> ETION DATE   BO	OREHO	) E I	004	ATION (L	at/l o	na oi	· Nor	th/Ea	et an	d Dati	um)		1;		7-00		-
NG	SED B1	Oct-17-13 Oct-18					/ E640							uiii)		S	006	65R		
		ACTOR/DRILLER D. McMackin	IN	I-SITU T	TEST	ΓING												CE ELEVATION 1 ft (NAVD88		
DRILL	ING METHO	D		RILL RI												ВО	REH	OLE DIAMETER		1
		MUD ROTARY(5'-101.5') (3) AND SIZE(S) (ID)		D-1 (B		R TYI	PF										in MMF	R EFFICIENCY	FRi	+
MC(	(2-1/2"), PS	S, SPT(1-3/8")	A	Automa	atic,	140	lbs, 30			•						7	8%			
	HOLE BACK t cement ar	FILL AND COMPLETION COUNTY		ROUNE EADING		TER	DURING Not Re			IG			RILLI Lecor	-	DATE	.	TAL 01.5	DEPTH OF BO	RING	
							1101110	00.0	lou					aca	_		1.0			1
Elevation (ft)	Depth (ft) Material Graphics			ple Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	rxuu (psf)	Drilling Method			
Elev	Depth Materia	Description		Sample	Sam	Sam	Blow			Reco	200	Dry I	Mois	Liqui	Plas	TXU	Drilli			
		<ul> <li>very stiff; moist; no plasticity; me rapid dilatancy; low toughness.</li> </ul>	edium dry strength	n;	SS- 18	80	9-20-21	41	18	11.5							M	PP: 3.9 tsf		
		SANDY lean CLAY (CL); hard; da with gray partings; moist; some S high plasticity; high dry strength;	AND; fine SAND; no dilatancy; very	<u></u>		81.5					59.9						000000000000000000000000000000000000000		-	
1/27/14	85	high toughness; strong cementati	on.	X	MC- 19	85 86.5	29-40-47	87	18	18								Pocket pen bare impression PP: >5.0 tsf TV: 2.25 tsf  HCL reacts vigo throughout the s	rously	No.: HSR13-57
10.3A BOREHOLE LOG - CHSTP F-B REV ARUP DOTR LIBRARY_MASTER LIBRARY.GPJ CHSR F-B_MASTER DATABASE.GLB 1/27/14  8	90	SANDY SILT (ML); very stiff; gree some SAND; fine SAND; no to lov strength; rapid dilatancy; low toug with SANDY CLAY and SILTY SA	w plasticity; low dr hness; interbedde	ed	20	90	9-9-10	19	18	16							000000000000000000000000000000000000000	4" of slough	-	02/2014 - RFP N
ER LIBRARY.GPJ CHSF		Poorly graded SAND (SP); very dibrown; moist; trace fines; mediun			U- 21	92		500 psi	14	14							<u> </u>		-	4
IR LIBRARY MAST	95	- dense; gray; fine SAND; micace	ous.	X	MC- 22	95 96.5	27-36-39	75	18	17								Rich in biotite	- - - - - - -	
F-B REV ARUP DO		SILTY SAND (SM); dense; gray; r fine SAND.	moist; some fines;	;														TAGE III DIQUE	-	
93.814 93.814	100	(continued)																		
90-90							REPORT BORING			)RD	)							HOLE ID S0065R		7
OLE I							IST.		UNT			OUT	E	PC	STM	IILE		EA		
1.0.3A BOREH	CA High-	LIFORNIA Speed Rail Authority	LIRS HMM ARLI	PARE THAP			ROJECT Californ RIDGE N	ia H	igh-	Spe F	REP		) BY				DA <sup>-</sup>		ET of 6	

California Hig	h-Sneed Train Freeno to Bakerefield	d													3157	1 NUM <b>7-00</b>	DEK	
	h-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DA				ATION (La							um)		HC	DLE ID			
NG	Oct-17-13 Oct-18-13				/ E640	5122	2.9	(NAI	D83	CA	Z4)			_	006		/A-TION	
DRILLING CONTR Gregg Drilling/I	RACTOR/DRILLER D. McMackin	IN-SITU	IES	TING										1			(ATION (VD88)	
DRILLING METHO		DRILL R	RIG											_			METER	
AUGER(0'-5'),	MUD ROTARY(5'-101.5')	D-1 (E	353)											5	in			
	S) AND SIZE(S) (ID)	SPT HA				inak	a dr	<b>.</b> .								REFFIC	IENCY, EF	₹i
MC(2-1/2"), PS	S, SPT(1-3/8")  (FILL AND COMPLETION	II			DURING			-	ΔΕΤΕ	ER D	RILLI	NG (	DATE		'8% ΣΤΔΙ Γ	)FPTH	OF BORIN	G
Neat cement g		READIN			Not Re						Reco				01.51		0. 50	
(ff) ) Graphics		rotion	Jumber	Depth (ft)	r 6 in.	(bl/ft)	on (in)	(in)	(%) h	Density (pcf)	Moisture Content (%)	nit (%)	Plasticity Index (%)	sf)	lethod epth			
Elevation (ft)	Description	S amn a	Sample	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery	200 Wash (%)	Dry Dens	Moisture	Liquid Limit (%)	Plasticity	TXUU (psf)	Drilling Method Casing Depth	C	Remarks/ other Tests	<b>.</b>
			SS- 23	100	22-22-18	40	18	9.5							MANDA			-
88.81 105	Borehole terminated at a depth of 101.5' o 10/18/2013.	'n							'									-
	Soil moisture indicated as "wet" because s became wet during retrieval through rotary drilling fluid. Soil moisture indication shou used as a definitive indication of a potentia	method ald not be																
99 91 105	surface or free groundwater table.																	-
38.81 105	See Borehole Log Legend for soil classific	eation chart																
	and key to test data and sampler type.	ation chart																•
=																		-
33.81 110																		
33.81 110																		:
=																		•
																		•
8.81 115																		
0.01 113																		
<u>=</u>																		
-																		
70.04																		
73.81-120																		
					REPORT											HOL		
				E	BORING	3 RE	ECC			· · · · ·	_	150	OT: -			S00	)65R	
					DIST.		UNT			OUT	E	PC	STM	ILE		EA		
		IMM ARLIP		F	ROJECT	OR	BRIE	GE I	NAM	E Train	,							
	Speed Rail Authority	SEPTE HOM-SPEED THAN			Californi BRIDGE N					ARE					DAT	E	SHEET	
									). M	lagg	<u>i .</u>				1-2	7-14	6 of	6

Calif	<b>fornia Hiç</b> SED BY	h-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE	BOREH	IOLF	LOCA	ATION (L	at/L∩	na o	r Nort	th/Ea	st an	d Dat	um)		1;		77-00
SV		Nov-07-13 Nov-08-13	N190	4337	7.367	' / E640									S	006	66R
		RACTOR/DRILLER 'E. Santellan	IN-SITU	J TES	STING	i											CE ELEVATION ft (NAVD88)
DRILL	ING METH		DRILL F	RIG											ВО	REH	OLE DIAMETER
	, ,	S) AND SIZE(S) (ID)	SPT HA	MME	R TY	PE										7/8 MME	IN R EFFICIENCY, ERI
MC(	2-1/2"), S	PT(1-3/8"), ST(2-7/8")	Auton	natic	; 140	) lbs, 30			•						8	5%	·
	HOLE BAC t cement c	KFILL AND COMPLETION	GROUN READIN		ATER	DURING Not Re			NG .			RILLI Recoi			1	TAL )1.5	DEPTH OF BORING ff
Elevation (ft)	Depth (ft) Material Graphics	Description  SILTY SAND (SM); medium dense; dark brown; moist; some fines; fine SAND; [FILL].	9	77.2.7.7 Sample Location 10 ф Sample Number	0	Blows per 6 in.	N-Value (bl/ft)	9 Penetration (in)	8 Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	sf)	Drilling Method Casing Depth	
188.90	5	SANDY SILT (ML); very stiff; dark brown variega with reddish brown; moist; some SAND; fine SA low to no plasticity, high dry strength; low toughr	AND;	SS		7-8-10	18	18	9								
173.90	10-	SILTY SAND (SM); medium dense; grayish brov moist; some SILT; medium SAND; micaceous.	wn;	MC 03		10-19-16	35	18	11.5	32.3		16.3					Asphalt in tube 2 on delivery (approximately 10.5' - 10.8')
178.90	15	SANDY CLAY (CL); stiff; grayish brown variegat with reddish brown seams; moist; some SAND; SAND; low dry strength; rapid dilatancy; low toughness; micaceous [NATIVE].		SS 04		3-5-7	12	18	13			15.3	30.7	13			Longer casing used 15.0 PP: 4.25, 1.75, 1.25 tsf
173.90	20	SILTY SAND (SM); medium dense; grayish brov variegated with reddish brown; moist; some fine fine SAND; interbedded with SANDY CLAY (CL) hard; grayish brown variegated with reddish brov some SAND; fine SAND; medium plasticity; very	es; ); wn;														
5		(continued)			l e	DEDODT	TITI	_									HOLEID
3					E	REPORT BORING	G RI	ECC									HOLE ID S0066R
					[	DIST.	CO	UNT	Υ	F	ROUT	Έ	PC	DSTM	IILE		EA
	CA High	LIFORNIA -Speed Rail Authority	ARLIP M-SHAD TRA	Pr.	(	PROJECT Californ BRIDGE 1	ia H	igh-	Spe P	ed REP		D BY				DA <sup>-</sup>	TE SHEET 27-14 1 of 6

SV DRILL Greç	ING CO	NTR	h-Speed Train Fresno to Bakersfield BEGIN DATE Nov-07-13 Nov-08-13 ACTOR/DRILLER E. Santellan		0433	37.3	367	ATION (La / E640									HO S	157 LE IC 006 RFAC	7-00 66R CE ELEVATION ft (NAVD88)	
	ING ME SER(0'		D MUD ROTARY(5'-101.5')	DRILL D44	RIG													REH 7/8 i	OLE DIAMETER in	
SAMP	LER TY	PE(S	S) AND SIZE(S) (ID)	SPT H				PE Ibs, 30	-incl	h dr	าก						НА		R EFFICIENCY, ERI	
BORE	HOLE I	BACK	PT(1-3/8"), ST(2-7/8")  FILL AND COMPLETION	GROU	NDV	۷A٦		DURING			•	AFT	ER D	RILLI	NG (I	DATE			DEPTH OF BORING	
Neat	ceme	nt gr	out	READI	NGS	; 		Not Re	cord	led		1	Not F	Recor	rded		10	)1.5	ft 	4
Elevation (ft)	Ö Depth (ft)	Material Graphics	Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		
	=		dry strength; high toughness; micaceous.			C- )5	20	4-11-10	21	18	18						1	000	PP: 1.75, 2.5, 2.75 tsf TV: 2.38 tsf	1
168.90 168.90 163.90	25		SILTY SAND (SM); medium dense; grayish brown moist; fine SAND; micaceous.  - Interbedded with SANDY CLAY (CL); stiff; grayish brown in the same of the		М	S- 06	25 26.5	8-10-6	16	18	10.5	45	108	13.7				666666666666666666666666666666666666	TXCD  PP: 3.25, 3.25, 2.5 tsf TV: 0.88 tsf	14 - KFP No.: HSK13-57
158.90	35		brown variegated with reddish brown.  SANDY SILT (ML); stiff; olive brown variegated reddish brown; moist; some SAND; fine SAND; nonplastic plasticity; low dry strength; rapid dilat low toughness; micaceous.  Poorly graded SAND with SILT (SP-SM); dense; grayish brown; moist; little SILT; fine to medium SAND; micaceous.	tancy; 	S	S- 08	31.5	19-24-24	48	18	11.5							00000	PP: 2.25, 1.0 tsf	04/02/201
158.90 15			SANDY SILTY CLAY (CL-ML); stiff; dark yellowi brown variegated with reddish brown; moist; sor	 sh me			36.5					12.7		12.2				<u> </u>		
153.90	40		SILT; some SAND; fine SAND; low toughness; micaceous.															000		$\equiv$
5			(continued)				R	EPORT	TITL	E									HOLE ID	$\dashv$
							E	BORING DIST.	3 RI				ROUT	E	PC	STM	ILE		S0066R EA	$\dashv$
			LIFORNIA Speed Rail Authority	ARUP H-SHAD TH	APV		P	ROJECT Californ RIDGE N	OR ia H	BRII igh-	OGE Spe	NAMeed PREF	1E	า D BY				DA1 1-2		

<b>Calif</b> .OGGI	ECT NAME <b>fornia Higl</b> ED BY	h-Speed Train Fres BEGIN DATE						ION (L									<b>1</b>	<b>3157</b> DLE ID	)	_
		Nov-07-13 ACTOR/DRILLER E. Santellan	Nov-08-13	N190				E640	o041	1.73	2 (N	NAD	83 C	A Z	4)		SU		CE ELEVATION	
DRILLI	ING METHO		 01.5')	DRILL D44													ВС		ft (NAVD88) DLE DIAMETER	
SAMPL MC(2	LER TYPE(S 2-1/2"), SP	S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8" FILL AND COMPLETIO	)	SPT H Auto	IAMM mati	c, 1	40 II	bs, 30				AFTI	ER D	RILLI	NG (	DATE	H/	AMMER 35%	R EFFICIENCY, ERI	
	cement gr			READI	INGS		N	Not Re	cord	led		١	lot F		rded		1	01.5	ft	_
Elevation (ft)	Depth (ft)		Description		Sample Location			Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
					Mo			5-10-10	20	18	15.5		106.3	22.2	26	5.5	UU 2713		PP: 1.75, 1.75, 2.0 ts TV: 0.25 tsf	-
48.90	45	SANDY lean CLAY (C	L); stiff; grayish brown; m	 noist.	U	J- 4 0	5			24	24		113.1	18.4	33	17	UU 1139		CONSOL Shelby push pressure to 500 psi in last 5"	e up
		SANDY SILT (ML); very variegated with reddis				4	.7											0000000000	to out psi in last o	
43.90	50—	fines; fine SAND; mica		ine	SS 1	1		8-23-15	38	18	9.5									
38.90	55	Poorly graded SAND ( trace fines; micaceous	SP); dense; dark gray; m s.	noist;			55 30	0-35-43	78	18	16		103.5	25.0					DS	
33.90	60	SAND; fine SAND; ver toughness; calcified s		little														000000000000000000000000000000000000000		-
		(continue	ea)				RF	PORT	TITL	E									HOLE ID	_
								ORING	3 RI				OUT	E	PC	OSTM	IILE		S0066R EA	—
	CA High-	LIFORNIA Speed Rail Autho	rity CALFORNA HA	ARLIP GH-SHAD TH	PAPI.		Ca	OJECT aliforni IDGE N	а Н	igh-	Spe P	REP		) BY				DAT 1-2	TE SHEET 27-14 3 of 6	

<b>Calif</b> OGG	ECT NAM <b>fornia h</b> ED BY				no to Bakersfield	d ATE BORE				ATION (L									<b>1</b>	<b>31577</b> DLE ID		
			Nov CTOR/DRI Santellar		Nov-08-13	N19 IN-SIT				/ E640	bU4	1.73	2 (N	NAD	83 C	ΑZ	4)		SL		6R E ELEVATION t (NAVD88)	
DRILLI	ING MET	THOD		ARY(5'-10	)1 5')	DRILL D44		3											BC		LE DIAMETER	
SAMPL	LER TYP	PE(S)	AND SIZE(	S) (ID)		SPT F	IAM			PE ) lbs, 30	ino	h dr	<b>an</b>						H/		EFFICIENCY, ERI	
BORE	HOLE BA	ACKF	ILL AND C	ST(2-7/8" OMPLETIO		GROL	JND	WA		DURIN	G DR	RILLIN	-						E) TC	DTAL D	EPTH OF BORING	i
Neat	cemen	nt gro	ut			READ	ING	5		Not Re	cord	ded		1	Not F		rded		1	01.5 ft	t	_
Elevation (ft)	S Depth (ft)	Material Graphics		С	Description		- Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests Calcified veins ~1/2"	thick
								SS- 13	61.5	4-6-8	14	18	16			18.0	31.8	12.1		000000000000000000000000000000000000000	Calcified veins ~1/2"	nick
28.90	65-11				nse; dark gray-dark Γ; fine SAND.	greenish	X	MC- 14	65 66.5	11-31-39	70	18	16							<u> </u>		
23.90	70		- very dens seams; mi		with laminated with	n black	X	SS- 15	70 71.5	19-29-24	53	18	11							0000		
18.90	75—				vith SILT (SP-SM); of fine SAND; micaced		X	MC- 16	75 76.5	20-25-31	56	18	17	5		23.5				<u> </u>		
13.90	80			ray; moist; s	ry dense; dark gray- some fines; fine SAN															000000000000000000000000000000000000000		
				(continue	ea)					REPORT	TITI	.E									HOLE ID	
									E	BORING DIST.	3 R				ROUT	E	PC	OSTM	IILE		S0066R EA	
1	C	AL gh-S	IFOR peed Ro	NIA il Author	7	MM ARUP	PAPI		(	PROJECT Californ BRIDGE 1	ia H	ligh-	Spe F	REF		D BY				DATI 1-27	E SHEET 7-14 4 of 6	

SV	<b>ornia</b> ED BY		<b>n-Speed Tra</b> BEGIN Nov-0	7-13		Bakersfi PLETION '-08-13	<b>ield</b> I DATE					TION ( / E640									HC S	3157 DLE ID 3006	6R		
			ACTOR/DRILLE. Santellan	.ER				IN-SIT	U T	EST	ING										SL	JRFAC	E ELE	VATION VD88)	
DRILLII	NG ME	ETHO	D	DV/E! 4	01 5"			DRILL D44	RIC	3											ВС	DREHO	DLE DI	AMETER	
			MUD ROTA ) AND SIZE(S		01.5)			SPT H	IAM	MEF	R TYI	PE									_	-7/8 i		CIENCY, ER	i
MC(2	2-1/2"	), SP	T(1-3/8"), S	T(2-7/8'	")			1				lbs, 3			•			<b></b>	NO /	D. 4. T. F	- 1	35%		OE BOBING	_
Neat				WPLETIO	Ν			READ	ING	S S	IEK	Not R			NG			Reco				01.5 f		OF BORING	خ
											_							(%)		(%)					
Elevation (ft)	⊝Depth (ft)	Material Graphics		1	Descriptio	on			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		Remarks/ Other Tests	
	85		- dense; gra		n gray; bl	ocky with	ı SANDY	SILT.	X	SS- 17 MC- 18	80 81.5 85 86.5	24-27-4: 20-28-2	72 72 72 72 69	18				19.2				000000000000000000000000000000000000000	DS		
98.90	95		- dark gray.						X		91.5 95 96	25-40- 50/4.5"	90/10.5		10.5							000000000000000000000000000000000000000			
<b>-</b> 93.90 <b>-</b> 1	100		(	continu	ed)							EPOR1	TITI	F									НОІ	.E ID	-
											E	BORIN	GR	ECC			ROUT	_	D/	) OT#	W F		S0	066R	
		- A -	UEODI	N II A		D.==	11.0.0.41	DUE				IST.		UNT				_		OSTM	IILE		EA		
	1	A	LIFORI Speed Rail	NIA		1 LIRS	HMM	AKUP			P	ROJEC	T OR	BRII	DGE	NAN	1E								
		-		,,,,		1					(	Californ	nia H	ligh-	Spe	eed	Trair	า							

PROJE					• .			Б.,																		CI NUN	IDEK	
<b>Calit</b> LOGGI	<b>ornia</b> ED BY	High	1-Spe	<b>ea 11</b> BEGIN	<b>rain</b> N DAT	<u>Fresi</u> Te	no to CON	<b>Bake</b> MPLET	e <mark>rsfiel</mark> FION D	i <b>d</b> Date	BORE	НО	LE L	OCA	TION (L	at/Lo	ng or	Nort	th/Ea	ıst an	d Dat	tum)		<b>1</b>	315 OLE I	<b>77-00</b> D		
SV				Nov-				ov-08-							/ E640									- 1		66R		
DRILLI						}					IN-SIT	U T	EST	ΓING													VATION	
	_		. San	tellar	1																			1	93.9	ft (NA	(88DV	
DRILLI							o				DRILL		3														IAMETER	
						′(5'-10	01.5')				D44													_	-7/8			
SAMPL											SPT H				PE Ibs, 30	incl	a dra	n								ER EFFI	ICIENCY, E	:Ri
						2-7/8"												-	^ C T			NO /			35%	DEDTI	LOE DOD!	
BOREH Neat				ND CO	OIVIPL	LETIO	IN				READ			IEK	DURING Not Re			IG .			RILLI			1	01.5		OF BORIN	NG
TVCat	CCITIC	in gi	out									П			NOL INC	COIG	eu		- 1	NOL F		ueu		<del>  '</del>	1 1	<del>                                      </del>		
Elevation (ft)	© Depth (ft)	Material Graphics	(ML);		; dark	dded v		ers of	SAND	Y SILT			Sample Number	Sample Depth (ft)	Blows ber 6 in.	% N-Value (bl/ft)	₽ Penetration (in)	o Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	_	Remarks/ Other Test: ery not recor	s
			Bore		ermin	nated a	ıt a dep	——————————————————————————————————————	01.5' o	n				101.5											<u> </u>			
88.90 1							jend fo nd sam			cation (	chart																	
38.90 1	05																											
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J.3U=1	20																											
														R	EPORT	TITI	F									HO	LE ID	
															ORIN			RD	)								0066R	
															IST.		UNT			ROUT	Е	PC	DSTM	IILE		EA		
	1	^	IIE/		NI	I۸			URSII	HMM A	RUP			-	ROJECT		DDI		NIA B									
11			LIF					7			-				Californ	ia H	الام -igh	oe Spe	ed	ı⊑ Trair	ı							
	H	igh-	Spee	d Ra	il A	utho	rity		CALE	DRIVE HO	-SHAD TH	PAPV			RIDGE I			P	REP	ARE	D BY				DA	ATE	SHEET	
																		J	J. Bo	orgh	esi				1-	27-14	6 of	6

PROJE <b>Calif</b>			<b>1-Speed T</b> BEGII	rain Fresi	no to Bak	ersfield	BODE			004	TION! (I	-1/1 -		. NI	u. /= .		1.0-1			1	3157	T NUMBER 77-00	
NG			Sep	-05-13	Sep-09		N19	020	)52.	248	TION (L / E640									S		67R	
			ACTOR/DRI E. Santellar				IN-SIT															CE ELEVATION 7 ft (NAVD88)	
DRILLI	ING M	ETHO	D		- 4 - 10		DRILL	. RIC		,										BC	REH	OLE DIAMETER	
	-	-	MUD ROT ) AND SIZE(		51.5')		D44 SPT F		MEE	Y TYP	of.										-7/8	in R EFFICIENCY, EF	 ?i
MC(2	2-1/2'	'), SP	T(1-3/8"),	ST(2-7/8"			Auto	oma	tic,	140	lbs, 30									8	35%		
		BACKI ent gro	FILL AND C	OMPLETIO	N		GROU READ				DURING Not Re			IG		ER D Not F					TAL 51.5	DEPTH OF BORIN	G
11000	00	J. 1. g. 1					-	П			NOCINO		lcu			100		ucu		<u> </u>	1		_
Elevation (ft)	o Depth (ft)	Material Graphics	- Part		Description			_	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests	
			Poorly gra- fines; med	ded SAND (	SP); loose; se SAND; [F	orown; moist; ILL].	trace		B- 01	0			60	60								COMP, RV Hand auger to 5.0'	
89.07	5		some SAN dilatancy; l	ID; high pÌas high toughne	sticity; high o	stiff; dark gra; dry strength; n	y; 10		MC- 02	5 6.5	3-6-7	13	18	15								Driller's note: cobble gravel at 7-8.5' 40-50% sand	es and
84.07	10		GRAVEL;		fine GRAVE	ve brown; tra L; moderate	ce		U- 03	10			30	18	42							Pushed Shelby tube 400 psi	at
79.07	15		brown; we	t; some SAN nigh dry stre	ND; fine SAN	stiff; light oliw ID; medium ilatancy; high			MC- 04	15 16.5	3-5-10	15	18	15.5		98.1 111.1	27.9 20.0	39	23	UU 2045		PP: 1.75 tsf TV: 0.41 tsf	-
74.07	20		Poorly gradense; bro	wn variegat	vith SILT (SI ed with redd	P-SM); mediu ish brown; fe	m w																-
77.07	-20			(continue	ed)																		
										В	EPORT BORING IST.	3 RI				ROUT	E	PC	OSTM	IILE		HOLE ID S0067R EA	
	H	CAI	LIFOR Speed Ro	NIA	rity	CALFORNA HO	ARLIP H-SIME TO	TAPI		C	ROJECT Californ RIDGE I	ia H	igh-	Spe F	REF		) BY				DA <sup>-</sup>	TE SHEET 27-14 1 of	3

<b>Calif</b> .OGGI	ECT NAME <b>fornia Hig</b> ED BY	h-Speed Train Fres		BORE	HOL	E L	OCA	TION (L	at/Lo	ng o	r Nor	th/Ea	ast an	d Dat	um)		<b>1</b>	<b>3157</b> DLE ID	)	_
Greg ORILLI	gg Drilling/I ING METHC		Sep-09-13	IN-SIT PS L	U TE Logg RIG	EST ging	ING	/ E640	71/3	o.59	(IN)	AU8	3 CA	4 Z4)	1		SL 1	94.07 DREHO	CE ELEVATION 7 ft (NAVD88) OLE DIAMETER	_
SAMPL MC(2	LER TYPE(\$ 2-1/2"), SF	MUD ROTARY(5'-1 S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8' (FILL AND COMPLETIO	')	1	IAMN mat	tic,	140	lbs, 30			•	AFT	ER D	RILLI	NG (	DATE	H/	85%	R EFFICIENCY, ERI	_
	cement g			READI	INGS	3		Not Re	cord	ded		1	Not F	Reco	rded		1	51.5	ft	
Elevation (ft)	Depth (ft) Material Graphics	1	Description				Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		
			·=	- — — —		//C- 05	20	9-17-17	34	18	15		94.3	22.1 23.8				000000000000000000000000000000000000000	Gravel sloughing into the top of the sampler  DS	ne
69.07	25	Poorly graded SAND moist; trace fines; fine rounded; micaceous.	(SP); dense; grayish brow e SAND; subrounded to	n;		ЛС- 06	25 26.5	12-21-28	49	18	17	3.9		18.1				<u> </u>	High muscovite conten	
64.07	30 111111111111111111111111111111111111	- medium dense.				SS- 07	30	5-10-14	24	18	12.5							000000000000000000000000000000000000000	Mostly sand cuttings returned	
59.07	35	- brown.				//C- 08	35 36.5	12-19-18	37	18	16		114.6	15.9				<u> </u>	DS	
54.07	40	reddish brown; little S strength; no dilatancy	· •	ith dry																
		(continu	ea)				R	EPORT	TITI	.E									HOLE ID	
							В	SORING IST.	3 R				ROUT	E	PC	OSTM	IILE		S0067R EA	
	CA High-	LIFORNIA Speed Rail Autho	URS HMM I	ARLIP GH-SHILD TH	JAPV		C	ROJECT Californ RIDGE N	ia H	ligh-	Spe	ed PREF	Trair	D BY				DAT 1-2	TE SHEET 27-14 2 of 8	_

<b>Calif</b> OGGI	ECT NAME <b>fornia Hig</b> ED BY	h-Speed Train Fresr BEGIN DATE						TION (La									<b>1</b>	<b>3157</b> DLE ID	
Greg DRILLI	gg Drilling/I ING METHO	Sep-05-13 RACTOR/DRILLER E. Santellan DD MUD ROTARY(5'-15	Sep-09-13	IN-SIT PS L DRILL D44	U TE _ogg	STII jing		/ E640	11/8	5.59	(IVI)	4U8	s CF	<b>₹ ∠4</b> )	<u> </u>		SL 1	94.07 DREH	CE ELEVATION 7 ft (NAVD88) DLE DIAMETER
MC(2 BORE	LER TYPE(\$ 2-1/2"), SF	S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8") (FILL AND COMPLETION	)	SPT H	IAMN omat JNDV	ic, 1	I40 ER	lbs, 30	3 DR	ILLIN	•						H/ 8	35%	R EFFICIENCY, ERI
INCAL	Cernent g	lout						Not Re	COIC	ieu			Not F		ueu		<del>  '</del>	31.5	
Elevation (ft)	Depth (ft) Material Graphics	D	escription				Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
						09 4	1.5	7-7-6	13	30	25	71							Pushed down Shelby tube at 400 psi
49.07	45	SANĎ; micaceous; stra SILTY SAND (SM); dei SAND (SP); dense; me	medium dense; brown n brown; moist; little fines atified with layers 3-6" thi nse, some fines; poorly g edium SAND; SANDY SIL some SAND; fine SAND.	ck of raded		1C- 1	4.5 45 6.5	14-23-19	42	18	16	16.4						<u> </u>	Possible oxidation staining
14.07	50	Lean CLAY with SAND moist; fine SAND; high toughness.	(CL); hard; greenish bla dry strength; medium	 ick;		1C-	50	12-29-50	79	18	15.5							<u> </u>	PP: 3.0, 3.0, 3.25 tsf TV: 0.48 tsf Munsell color 5GY 2.75/
		Poorly graded SAND (smoist; trace fines; fine subrounded.	SP); very dense; olive gra to medium SAND;	ay;		12	1.5	12-29-30	79	10	13.3	76	104.5	23.6	32	10		<u> </u>	Grades to SP from CL from 50.4' to 51.0'
39.07	555	few SAND; medium pla	medium stiff; greenish g	/		13	55	22-18-26	44	18	16							MM	Interbedded PP: 3.25 tsf TV: 0.4 tsf
34.07	60	medium SAND; lensed CLAY pockets; subrou Lean CLAY with SAND	d with 0.5" diameter SANI nded. 0 (CL); very stiff to hard; c ;; little to few SAND; med	DŸ  lark															
		(continue	d)																
							В	EPORT BORING IST.	3 RI				ROUT	E	PC	DSTM	IILE		HOLE ID S0067R EA
		LIFORNIA Speed Rail Author	rity CALECGIVE PAGE	ARLIP BH-SIMED TO	VAPI		C	ROJECT Californi RIDGE N	а Н	igh-	Spe F	ed REP		D BY				DAT 1-2	E SHEET 3 of 8

	ECT N <b>fornia</b> ED BY		<b>n-Speed Train F</b> BEGIN DAT	resn E	o to Bak	Kersfield ETION DATE	BORE	HOI	LE L	_OCA	ATION (L	at/Lo	ng o	r Nor	th/Ea	ast ar	ıd Da	tum)		1	ROJEC <b>3157</b> DLE ID	
NG DRILLI	ING C	ONTR	Sep-05-1 ACTOR/DRILLER E. Santellan		Sep-0			020 TU T	)52. ES1	.248 ΓING	/ E640									SL		STR DE ELEVATION 7 ft (NAVD88)
ORILLI	ING M	ETHOI )'-5'),	D MUD ROTARY(		1.5')		DRILL D44	RIC	-	9										ВС		OLE DIAMETER
MC(2	2-1/2	"), SP	) AND SIZE(S) (ID T(1-3/8"), ST(2- FILL AND COMPL	7/8")				oma	itic,	140	) lbs, 30				AFT	FR D	RILI	ING (	DATE	8	35%	R EFFICIENCY, ERI
		ent gr					READ				Not Re					Not F	Reco		<u> </u>	1	51.5	
Elevation (ft)	Depth (ft)	Material Graphics		De	escription			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
									MC- 14	61.5	10-18-24	42	18	15								
									U- 15	62			30	24		106.8	22.3	41	27	UU 2470	<u>NONDONDONDO</u>	Pushed down Shelby tube at 600 psi
29.07	65		- some fine SAN - little SAND; hig		icity; high	toughness.			MC- 16	64.5 65 66.5	10-16-15	31	18	10.5						2470		PP: 4.0 tsf TV: >1.0 tsf Munsell color 5G 2.75/1
24.07	70		CLAYEY SAND (few fines; medius cementation.	SC); d n to fir	ense; greene SAND;	enish black; n subrounded;	noist; strong		MC- 17	70 71.5	17-21-36	57	18	15	_							
19.07	75		- black.						MC- 18	75 76.5	20-34-43	77	18	15							000000000000000000000000000000000000000	
14.07	-80		SANDY lean CL/ little SAND; high toughness.	AY (CL dry str	); stiff; gre ength; no	enish black; dilatancy; hig	moist; h															
			(con	tinued	d)						REPORT	ודוד	F									HOLE ID
_		<b>.</b>								E	BORING DIST.	3 R				ROUT	E	P	OSTM	1ILE		S0067R EA
	H	JA ligh-	LIFORNI Speed Rail Au	A	ity 🚽	LIRS HMM	ARLIP	TOAPY		(	PROJECT Californ BRIDGE 1	ia H	ligh-	Spe F	PREF		D BY	,			DA1	TE SHEET 27-14 4 of 8

	ECT N		<b>n-Speed Train</b> BEGIN DAT	Fresi	no to Bak	cersfield	DODE	-1101		004	TION (L	ot/l o	22.0	. Nor	th/⊏a	ot on	d Do	tı ımı\		1	3157		
NG			Sep-05-7	13	Sep-09		N19	020	)52.	248	/ E640									S	006	67R	
			ACTOR/DRILLER E. Santellan				IN-SIT															CE ELEVATION 7 ft (NAVD88)	
		ETHO	D MUD ROTARY	(5'-1	51 5')		DRILL D44	RIC												BC	REH	OLE DIAMETER	
		-	i) AND SIZE(S) (ID		31.3)		SPT I		MEF	R TYI	PE										-7/8 i AMMEI	IN R EFFICIENCY,	ERi
MC(	2-1/2	"), SP	T(1-3/8"), ST(2 FILL AND COMPL	2-7/8"	)						lbs, 30			•	AFT		ווח	INIC /			35%	DEPTH OF BOR	DINIC
		ent gr		EHO	N		READ			IER	Not Re			NG		Not F					51.5		KING
										)							(%)		(%)				
Elevation (ft)	Depth (ft)	Material Graphics						Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remark	
ш	-80 <u>-</u>	≥		Ľ	escription			_	SS-	80	5-5-6	Ż	18	18	7(	۵	Σ		Д	Ĥ		Other Te	ests
	Ξ							X	19								24.4	41	29				
	Ξ							$\mathcal{H}$		81.5							24.4	41	29				:
	Ξ								U- 20	82			30	20.5								Pushed down Stube at 800 psi	helby
	Ξ																						•
	=		- lensed with fre	quent	0.3" pocket	s of poorly gra	aded			84.5											000000000000000000000000000000000000		•
09.07	85—		fine SAND.	•	•	. , ,					04.07.07		10	10									
	Ξ		CLAYEY SAND some to little CL	AY; fir	ne SAND; v	veak cementat	tion.		MC- 21	85	21-27-37	64	18	16									
	Ξ							Δ		86.5													•
	=																						
	Ξ																						
	Ξ																						
	Ξ																						
04.07	90		- fine to medium	SANE	<b>)</b> .				MC-	90	13-28-44	72	18	12	-								
	=							Ň	22														•
	Ξ									91.5													
	Ξ																				1000		
	Ξ																						
	=		SILTY SAND (S fines; fine SAND			ark gray; mois	t; little																•
99.07	95																				000000000000000000000000000000000000000		
	95								MC- 23	95	30-45- 50/5"	95/ 11"	17	14	27.6							High biotite cont	ent -
	=							Λ		96.42													
	=																						•
	Ξ		SILT with SAND plasticity.	(ML);	very stiff; w	vet; fine SAND	; low																
	Ξ																						
94.07	100-	11111	(coi	ntinue	ed)							1					<u> </u>				2	<u> </u>	
			(150)		•						EPORT											HOLE ID	
											BORINO DIST.		ECC			ROUT	E	PC	OSTM	IILE		S0067R EA	
0	<b>(</b>	A	LIFORN	IA		URS HMM	ARLIP				ROJEC												
	F	ligh-	Speed Rail A	utho	rity ===	CALETHER HO	BH - SHAKD T	WARY			Californ RIDGE 1					Trair PARE					DAT	TE SHEE	T.
																1agg						27-14 5 c	

Calif	ECT N fornia ED BY	ı High	n-Speed Tra BEGIN I	in Fres	no to Ba	<b>kersfield</b> ETION DATI	E ROD	EUC	N E I	00/	ATION (L	at/Lo	ng o	r Nor	th/Es	net an	ıd Da	tum)		1	OJEC <b>3157</b> OLE ID		
NG			Sep-0	5-13	Sep-0		N19	902	052	.248	3 / E640									S	006	7R	
Greg		lling/E	ACTOR/DRILL  Santellan  D	ER			IN-SI PS DRIL	Log	ggin		i 									1	94.07	THE PROPERTY OF THE PROPERTY O	
AUG	SER(0	'-5'),	MUD ROTA	-	51.5')		D44	4												4	-7/8 i	n	
			) AND SIZE(S) T(1-3/8"), S		)		SPT Aut				PE ) lbs, 3(	)-inc	h dr	ор							AMMER 85%	R EFFICIENCY, ER	
BORE	HOLE	BACK	FILL AND COM				GRO REAL			TER				1G						1		DEPTH OF BORING	}
Neat	ceme	ent gr	out				INLAL	JINC	-		Not Re	core	ded		1	Not F		rded		1	51.51	ft	
Elevation (ft)	S Depth (ft)	Material Graphics		[	Description			- Sample Location	_	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
								X	SS- 24	100		43	18	16.5	81						RODDORDORD	High biotite content	
89.07	105		SILTY SAND fines; fine SA		ry dense; o	dark gray; we	et; little		SS-	105	10-29-35	64	18	11.5									-
			Poorly grade wet; some fir	d SAND ( nes; fine \$	SP); very o	dense; dark ς	gray;		25	106.5											000000000000000000000000000000000000000		-
34.07	110		SILTY SAND micaceous.	(SM); de	nse; dark	gray; wet; fin	e SAND;																
								X	MC- 26	110	18-25-31	56	18	16	46	94.5	28.7				$\sim$	High biotite content	
79.07	115		- very dense;	some fin	es; no mic	aceous.		I	SS- 27	115	12-35-34	69	18	10.5							<u> </u>	High biotite content	
			Poorly grade wet; trace fin	es; fine S	AND; mica	aceous.				116.5											<u> </u>		
74.07	120		Lean CLAY v SAND; fine S high toughne	SAND; me																			
			(	continue	ed)					1 -	)EDOS=	T17'	_									1101 5 15	
										E	REPORT BORIN DIST.	GR				ROUT	E	PC	OSTM	IILE		HOLE ID S0067R EA	
	H	CA ligh-	LIFORI Speed Rail	VIA Autho	rity	LRS HMM	HQH-SHITT	TWAP		(	PROJEC Californ BRIDGE	ia H	ligh-	Spe	ed REF		D BY				DAT 1-2	E SHEET 87-14 6 of 8	}

Calif .ogg NG	FORN ED E	<b>nia Hig</b> BY	<b>h-Speed Train</b> BEGIN DA Sep-05-		o to Bakersfield COMPLETION DATE Sep-09-13					ATION (L 5 / E640									HC	3157 DLE ID 3006	)
ORILLI Greg	gg D ING	rilling/l METHC	RACTOR/DRILLER E. Santellan DD	₹	·	IN-SIT PS I DRILL	U T _og . RIG	ES	ΓING										SL 1	JRFAC 94.07 DREHO	CE ELEVATION 7 ft (NAVD88) OLE DIAMETER
MC(	LER 2-1/	TYPE(9	MUD ROTARY S) AND SIZE(S) (II PT(1-3/8"), ST(2 KFILL AND COMP	D) 2-7/8")			HAM	atic,	140	lbs, 30			•	ΔΕΤ	FR D	RILLI	NG (	DATE	H/ 8	35%	R EFFICIENCY, ERI
		ment gi				READ				Not Re			· ·			Reco			1	51.5	
Elevation (ft)	Depth (ft)	Material Graphics		De	escription		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
	-		Poorly graded swet; trace fines	SAND (S	P); very dense; dark gr ND; micaceous.	ay;	X	MC- 28	120 121.42	8-28- 50/5"	78/ 11"	17	16		109.1	19.4	28	15			PP: 3.25, 2.75, 2.75 tsf TV: 0.50 tsf Blow counts indicated a very hard layer at 121.1' to 131.4'.
69.07	125-			egated w	rith gray; fine to mediur	n	I	SS- 29	125 126.5	21-40-48	88	18	10.5								Coarse sand in sloughed material.  High biotite content
64.07	130-		little SAND: fine	e SAND; dilatancy SAND (Se	(CL); very stiff; dark gra high plasticity; high dry ; high toughness; interf C); very dense; dark gra micaceous.	/	X	MC- 30	130 131.5	10-15-29	44	18	17		101.4	25.5			UU 4192	<u> </u>	Feels cemented in clay and sand PP: 3.5, >4.5, >4.5 tsf TV: 1.0 tsf
59.07	135=		- not interbedde	ed.			X	SS- 31	135 136.5	6-9-13	22	18	12	81		23.1	41	25			Sand rich in biotite
54.07 <b>-</b>	- 140 <b>-</b>		(со	ntinuec	0)				1 -		T::::										Lugis is
									E	REPORT BORING DIST.	3 R				ROUT	E	PC	OSTM	IILE		HOLE ID S0067R EA
		CA High-	LIFORN Speed Rail A	IIA Authori	LIRS HMM	ARLIP (GH-SHUID TI	TIAN .		F	PROJECT Californ BRIDGE I	OR ia H	BRII igh-	OGE Spe	NAMeed PREF	1E Trair	າ D BY				DA1	

	fornia		-Speed	Train	Free	no to l	Bakor	sfield																	7-00	SEK	
	SED BY	, riigi	n-Speed BEG																				HC	OLE ID	)		
NG	INC C	ONTO	Se ACTOR/D	ep-05-		Sep	p-09-1	3	IN-SI				3 / E6	407	178	3.59	(N	AD8	3 C/	4 Z4)	)			1006		VATION	
			E. Santell		Χ				PS				1													AVD88)	
DRILL	ING M	ETHO	D						DRIL	L RI													_			AMETER	
			MUD RO			51.5')			D44															-7/8			
			) AND SIZ T(1-3/8"			`			SPT				PE ) lbs,	30-	incl	n dra	าท						- 1	AMME 85%	R EFFIC	CIENCY, ER	Ri
			FILL AND						1				DUR					AFT	ER D	RILLI	ING (	DATE			DEPTH	OF BORING	G
Neat	t ceme	ent gr	out						READ				Not							Reco			1	51.5	ft		
Elevation (ft)	Depth (ft)	Material Graphics				Descript				Sample Location	Sample	Sample Depth (ft)	Blows per 6 in.		N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method		Remarks/ Other Tests	
			- hard; li dilatancy Poorly g trace fin	y; low to raded S	oughne SAND (	ss. SP); ve	ery dens	e; gray; w	vet;	X	MC- 32	140 141	40- 50/5.	5"	50/ 5.5"	11.5	11.5							MANNE			
49.07	145		- mediur subroun					e SAND;		$\boxtimes$	SS-33	145 45.42	50/5 2	5"	50/ 5"	5	5							000000000000000000000000000000000000000			
44.07	150		- mediur	n SANI	D.					V	MC- 34	150	23-37	-41	78	18	15	-						MANN	Rich in	biotite	-
	Ξ									_/\		151.5	i														
	Ξ		Borehole	e termir	nated a	it a depl	h of 151	1.5' on 9/9	9/2013.																		Ξ
			See Bor and key					assificatio e.	n chart																		
39.07	155																										
	=																										=
	=																										=
34.07	160-																										
													REPOR				)DD	<u> </u>							HOL	E ID 067R	
													BORI DIST.	ING		UNT			ROUT	Έ	PC	OSTN	1ILE		EA	<i>J</i> U / IX	
C	20		LIFO	RN	IΙΔ			RS HMM	ARLIP			F	PROJE	СТ	OR	BRII	OGF	NAI/	1E								
			Speed F	INI N			71	==	1111				Califo	rnia	a H	igh-	Spe	ed '	Trair					1			
		iign-	opeea I	tall A	umo	riiy	7	T CALEDNAN I	HOH-SHALD T	TRAPE		E	RIDG	ΕN	UME	BER	F	REP	ARE lagg	D BY i				DA <sup>1</sup>	ΤΕ 2 <b>7</b> -14	SHEET 8 of 8	3
																		۱۷ . د	.ugg					1-2	-, , , , ,	<u> </u>	_

<b>Cali</b>	fornia GED BY		h-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE				ATION (L									<b>13</b>	<b>3157</b> LE ID		$\dashv$
			Oct-21-13 Oct-22-13 ACTOR/DRILLER D. Heavilin		98742 U TES		7 / E640 6	9397	7.82	5 (N	IAD	83 C	CA Z	1)		SUI	RFAC	SER CE ELEVATION	-
DRILL	ING ME	THO	D	DRILL	. RIG													4 ft (NAVD88)  OLE DIAMETER	$\dashv$
			MUD ROTARY(5'-151.5')		(B53)		'DE										0 in	D EEEIOIENOV EE	_
			S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8")	1	HAMME omatic		PE ) lbs, 3(	)-incl	h dr	ор							ΜΜΕΙ 3%	R EFFICIENCY, ERI	
BORE	HOLE	BACK	FILL AND COMPLETION			ATER				NG A					DATE	.		DEPTH OF BORING	
Piez	omete	r		READ	INGS		Not Re	cord	ded			lot F	Reco	ded		15	51.5	ft ⊺	4
Elevation (ft)	Depth (ft)	Material Graphics	Description		Sample Location Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
			SILTY SAND (SM); medium dense; grayish brov dry; some fines; trace GRAVEL; fine SAND; fine GRAVEL; [FILL].	e	в 0 100000000000	0			60	60	42.2		6.4				2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	COMP, RV Hand augered to 5.0'	
193.24	5		SANDY SILT (ML/SM); medium dense; grayish with brown seams; dry; some SAND; fine SAND weak cementation; [NATIVE].		∏ MC 02		7-8-10	18	18	14	53	110.9	11.9					Cementation reacts wit HCL	
188.24			- brown; medium SAND.			6.5											100000000000000000000000000000000000000		
188.24	10				SS- 03		3-6-10	16	18	12.5	52						SOCOSOCOSOCOSOCOS	Reacts with HCL	
183.24	15		SANDY SILT (ML); very stiff; brown mottled with reddish brown; moist; some SAND; fine SAND; plasticity; micaceous.		T MC-	- 15	9-18-24	42	18	10							000000000000000000000000000000000000000		
183.24 178.24					04	16.5					60	112.7	15.7				<u> </u>	DS	
178.24	20		SILTY SAND (SM); medium dense; grayish brown variegated with reddish brown; moist; some fine SAND.														000000000		
5			(continued)			,													_
90						E	REPORT BORIN DIST.	G RI				ROUT	F	PC	STM	II E		HOLE ID S0068R	
		- ^	LICODNII A Tumpiani	ADI ID									_	۲	ا ۱۷۱ ت	ILE		LA	
		A	LIFORNIA JURS HMM	KLIP		F	PROJECT Californ	i or i <mark>a H</mark>	BRII igh-	Spe	NAM ed	ı∈ Trair	า						
<b>4</b>	H	igh-	Speed Rail Authority	H-SHID TO	PAPI		BRIDGE			P	REP		D BY				DA7	TE SHEET 27-14 1 of 8	
										J	. D(	Jign	COI				1-2	.1-1 <del>4</del>   1 UI O	

		IAME <b>a High</b> ⁄	n-Speed Train Fresi BEGIN DATE	no to Bakersfield COMPLETION DATE	BORE	HOI	IFI	004	ATION (L	at/l o	na o	r Nor	th/Es	et an	ıd Dat	tum)		1	ROJEC 1 <b>3157</b> OLE ID	
SV			Oct-21-13	Oct-22-13	N18	987	742.	.757	/ E640									5	3006	8R
			ACTOR/DRILLER D. Heavilin		IN-SIT	U T	ES1	ΓING												CE ELEVATION 4 ft (NAVD88)
RILLI	NG M	ETHO	D	51 <i>E</i> '\	DRILL													ВС	OREH	OLE DIAMETER
	•	•	MUD ROTARY(5'-1:  AND SIZE(S) (ID)	51.5)	D-1 SPT F	`		R TY	PE									_	5.0 in	R EFFICIENCY, ERI
MC(2	2-1/2	"), SP	T(1-3/8"), ST(2-7/8"						) lbs, 30			•						- 1	78%	
	omete		FILL AND COMPLETION	N	READ			IER	Not Re			NG			RILLI Recoi			1	51.5	DEPTH OF BORING ft
					•			_							(%)		(%)	•		
Elevation (ft)	Depth (ft)	Material Graphics	Ε	Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
	25						SS- 05	21.5	7-10-12	22	18	11								
73.24	25		brown seams; stratifie very stiff; brown varieg seams; high toughnes dry strength.	n variegated with dark redo d layers of SANDY CLAY pated with reddish brown s; medium placticity; very	(CL); high		MC- 06	25 26.5		31	18	15.5		118.7	14.5					PP: >5.0, >5.0 tsf TV: 1.13 tsf DS Layer of CLAY between two samples
68.24	30			with SILT (SP-SM); dense s; fine to medium SAND; ous.			SS- 07	30	15-22-27	49	18	16.5	13.3		11.2					
63.24	35		with reddish brown; m	ium stiff; grayish brown m oist; little SILT; medium t y strength; medium toughr	o high	- - 	MC- 08	35	9-12-16	28	18	18				07				PP: 4.0, 3.75, >5.0 tsf TV: 0.23 tsf
			CII Turib CAND (A)	you stiff brown these		<u> </u>		36.5						98	26.5	37	20	UU 2595		
58.24 <b>–</b>	40		little SAND; fine SAND dry strength; low tough		high															
			(continue	ed)				l e	DEDODT	ナリナリ										HOLEID
		. 410						E	REPORT BORING DIST.	3 R				ROUT	E	PC	OSTM	IILE		HOLE ID S0068R EA
	(	CA	LIFORNIA Speed Rail Autho	LIRS HMM	ARLIP			F	ROJEC <sup>*</sup>	OR ia H	BRII	DGE Sne	NAN	IE Trair	า					
	L	lieb.	Speed Pail Author	rib.	188188	1			BRIDGE I					ARE					DA	

	ECT NAME <b>fornia Hig</b> ED BY		esno to Bakersfield	d ATE BORE	HOI	FI	OC.	ATION (L	at/I o	na o	· Nor	th/Fa	ıst an	d Dat	tum)		1	ROJEC <b>3157</b> DLE ID		
SV		Oct-21-13	Oct-22-13	N18	987	'42.	757	/ E640	939	7.82	5 (1	NAD	83 C	A Z	4)		S	3006	88R	
		RACTOR/DRILLER 'D. Heavilin		IN-SIT	UT	EST	ING												CE ELEVATION 4 ft (NAVD88)	
RILLI	ING METHO		' 151 5'\	DRILL													BC	DREH	OLE DIAMETER	
		S) AND SIZE(S) (ID)	-151.5)	D-1 SPT H	•	-	RTY	PE										5.0 in AMMEI	R EFFICIENCY, ERI	
		PT(1-3/8"), ST(2-7		I				) lbs, 30						<b>5</b>	NO /	D		78%	DEDTIL OF BODING	
	ometer	KFILL AND COMPLET	HON	READ			IEK	Not Re			NG		lot F		•		1	51.5	DEPTH OF BORING ft	i
				•										(%)		(9)	1			
Elevation (ft)	Depth (ft) Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	40 	SILTY SAND (SM) SILT; medium SAN	; dense; dark gray; mosi ID.	it; some		SS- 09	40 41.5	5-13-23	36	18	18							00000000000	PP: 3.25, 2.5 tsf  Coarse SAND/fine GRAVEL in top of sar	npl <u>e</u>
53.24	45	yellowish brown; m	); medium stiff; dark gra losit; some SAND; fine s high dry strength; low to	SAND;		MC- 10	45 46.5	16-14-17	31	18	12								PP: >5.0 tsf TV: 0.40 tsf	
18.24	50-	of brown with redd	hard; brown layered wit issh brown seams; moist little CLAY; low plastici ness.	; some		SS- 11	50	9-9-16	25	18	14								PP: 4.25, 3.75 tsf	
43.24	55-		ID with SILT (SP-SM); d LT; fine SAND; micaced			MC- 12	51.5	24-28-33	61	18	16	53.6	111.7	17.4				000000000000000000000000000000000000000	1" Grayish brown SP- layer Color to dark gray at 51.4", grain size	SM
38.24		SAND; very high di	nund				56.5													-
		(conti	nued)					REPORT	TITI	F									HOLE ID	
							E	BORING DIST.	3 R				ROUT	E	PC	OSTM	IILE		S0068R EA	
	CA High	LIFORNIA -Speed Rail Aut	hority	MM ARLP	TARY		(	PROJECT Californ BRIDGE N	ia H	ligh-	Spe F	REF		D BY				DA1	TE SHEET 27-14 3 of 8	

ROJE <b>Calif</b> OGGI			n-Speed Train Fr BEGIN DATE	resno to Bakersfield COMPLETION DATE	BORE	НО	LE L	.OCA	ATION (I	_at/Lo	ong o	r Nor	th/Ea	st an	d Dat	tum)		1	<b>3157</b> DLE ID	
SV			Oct-21-13	Oct-22-13	N18	987	742.	757	/ E640	939	7.82	5 (1	NAD	83 C	A Z	4)			S006	
			ACTOR/DRILLER  D. Heavilin		IN-SIT	υſ	ES]	ING										- 1		CE ELEVATION 4 ft (NAVD88)
		ETHO	D MUD ROTARY(5	' <u>'</u> _151 5')	DRILL D-1													- 1		OLE DIAMETER
			i) AND SIZE(S) (ID)	1-101.0)	SPT F	•		R TYI	PE										5.0 in AMMEI	R EFFICIENCY, ERI
			T(1-3/8"), ST(2-7						) lbs, 3			•			<b>5</b>	NO /	D. 4 T.		78%	
Piezo			FILL AND COMPLE	HON	READ			IEK	Not R			NG		Not F				1	51.5	DEPTH OF BORING ft
															(%)		(9)			
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests
	60-					$\prod$	SS- 13	60	6-7-7	14	18	11							MANN	PP: 2.5, 3.25, 2.5 tsf
	=					M		61.5							21.5	35	7		1000	
			greenish gray; moi	CL); soft; dark gray to dark st; little SAND; little SILT; fii ium plasticity; very high dry nness.	ne															
20.04	=																			
33.24	65					V	MC- 14	65	9-14-17	31	18	16							) (1)	Recovery not noted on log PP: 1.25, 1.5, 2.0, 2.0
	Ξ					N		66.5											100	TV: 0.20 tsf
	=						U-	67			24	24	-	107.6	20.5	33	16	UU		CONSOL
	Ξ		- little to some SAN	ND.			15	01						107.0	20.0	00	10	2027	DOUG	Shelby tube pushed at 500 psi
	Ξ																			
	Ξ					1		69												
28.24	70						SS-	70	11-13-16	3 29	18	11							<u> </u>	
	_					М	16													
	Ξ					А		71.5							13.6	29.3	7.7		DUDU	PP: >5.0 tsf
	Ξ																		000	
	=																			
	_																		000000000000	
	Ξ																			PP: 1.0, 0.5, 1.0 tsf
23.24	75		- medium stiff; dar medium plasticity.	k greenish gray; little SAND	;	H	MC- 17	75	26-32-34	66	18	15							<u> </u>	TV: 0.30 tsf
	=			SP-SM); dense; dark gray; m	noist;	N	••	76.5							23.8				<u> </u>	
	_		inue lines; fine to r	HEUIUIII SAND.		Н		, 0.0											<u> </u>	
	Ī																			
			SILTY SAND (SM/ gray; moist; some	ML); very dense; dark green	 ish	-													1000	
	=		gray, moist, some	mico, inic oand.																
18.24	_80 <u></u>																			
			(conti	nued)				,												
									REPORT BORIN			ORD	)							HOLE ID S0068R
									DIST.	CC	TNUC	Υ	F	ROUT	E	PC	DSTM	IILE		EA
	<b>(</b>	CA	LIFORNIA	LIRS HMM	ARLIP				ROJEC						<u> </u>					
	1	ligh-	Speed Rail Aut	hority CALECREAN	HOH - SHALL T	VAPV			BRIDGE					ARE					DAT 1-2	

LOGGE	ornia I			N DATE	COM	1PLETION	field N DATE					ATION (										<b>1</b>	1 <b>315</b> OLE I	<b>77-0</b> D			
Grego	g Drilliı	ng/D	ACTOR/DRI	-21-13 LLER	Oct	t-22-13		IN-SIT	UT	EST		/ E64	U93	⊌/.	o25	) (N	NAD	03 C	,A Z	<del>(+)</del>		SI 1	JRFA 198.2	24 ft (	LEVATIO	8)	
DRILLIN AUGE			MUD ROT	ARY(5'-1	51.5')			DRILL D-1														- 1	OREH 5.0 in		DIAMETE	R	
MC(2	:-1/2"), IOLE B	SP	AND SIZE T(1-3/8"), FILL AND C	ST(2-7/8'					JND	atic, WA	140	PE ) lbs, 3 DURII Not R	NG [	DRIL	LIN				RILL			7 E) TO	78%	. DEP	TH OF BO		
Elevation (ft)	Depth (ft)	Material Graphics		I	Descripti	tion			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N 1 1 / - 1 - 1 - 1 / 1 / 1 / 1 / 1 / 1 /	N-Value (Divit)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Casing Depth	Rema Other 1		
113.24 8	85									MC-	80 81.5	11-26-4 33-26-2			18	14	46.9						000000000000000000000000000000000000000				
			gray; mois very high o	LTY CLAY t; some SA dry strength nodules <	ND; fine ; low tou	SAND; lo	ow plastici	enish ty;	X	19	86.5							107.5	19.7			UU 2477		PP	acts with Hi : >5.0, >5.0 : 0.40 tsf		
08.24	90		SAND; me SILTY SAI some fines SANDY SI grav: mois	SAND (CL dium plasti ND (SM); ve s; fine SANI LTY CLAY t; some SA	icity. ery dense D. (CL-ML)	e; dark gr	ray; moist;	<u> </u>		SS- 20	90	26-30-3	4 6	4	18	13.5											
103.24	95			nigh dry str d SILTY SA t; some fine			ness; ; dark gree	enish		MC- 21	95 96.5	13-18-1	8 3	6	18	17							<u> </u>	PP TV:	: 1.5, 1.5, 1 0.20 tsf	.0 tsf	
<b>-</b> 98.24 <b>-</b> 10	00		moist; son	LT (ML); vene SAND; fing strength; of poorly continue	ine SANI low toug graded S	D; low pla	asticity; nterbedded	d															MANNER				
												REPOR'				RD									HOLE ID S0068R		
	) C	ΔΙ	IFOF	ΔΙΜΩ		LIRE	S HMM AF	SUP.			F	PROJEC	CT C	OU R B	RID	Y IGE I	NAM			P	OSTM	1ILE		E	A		
	Hi	gh-S	IFOR	il Autho	ority	1	DALPCHIEF HON-	-SPARIOTI	TAPI		(	Califor BRIDGE	nia	Hig	gh-S	Spe P	ed REP	Trair	D BY				DA 1-	TE -27-1	SHE	ET of 8	

	ECT NA <b>fornia</b> ED BY		h-Speed	d Train I	Fresno	o to Ba	akersfiel LETION D	d ATE BO	DEHO	) E	LOCA	ATION (I	at/l c	na o	r Nor	th/Es	et an	d Dat	tum)		1	OJEC <b>3157</b> DLE ID		
SV			(	Oct-21-1	3	Oct-2		N	N1898	3742	2.757	7 / E640	939	7.82	5 (1	NAD	83 C	A Z	4)		S	006	8R	
			ACTOR/ D. Heav	DRILLER ilin				IN-	-SITU	ΓES	ΓING	;											E ELEVATION IN TERMINATION IN THE PROPERTY OF	
	ING ME			OTARY	(5'_151	1 5')		I	RILL RI D-1 (B												BC	REH	DLE DIAMET	
				IZE(S) (ID		1.0 )		SF	PT HAN	име	RTY										H/		R EFFICIENC	CY, ERi
				B"), ST(2				I .				Olbs, 3			•	ΔΕΤ		ייוום	NG /	חאדר		'8%	DEPTH OF B	OBINIC
	omete		TILL AINI	D COMPL	ETION				EADIN(		AI ER	Not R			NG		Not F		•		1	51.5		ORING
		S									<u>.</u>							t (%)		(%				
Elevation (ft)	Depth (ft)	Material Graphics			De	scriptior	n		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Rem Other	
一	100			dark green			st; trace fin	nes; fine to		SS- 22	- 100				13	.,	_				Ċ			
93.24	105			nigh dry st	rength;	not inter	rbedded.		X	MC	101.5	26-39-4	5 84	18	12							<u> </u>	PP: 2.5, 2.0 t TV: 0.05 tsf	sf
			SILTY fine SA		M); dens	se; gray;	; moist; litt	de fines;		23	106.5	5					100.5	25.3		NP		<u> </u>	1V. U.U5 ISI	
38.24	110								X	SS- / 24	111.5	10-17-2	38	18	14	22.4								
83.24			moist; very hig	some SÀN gh dry stre	ND; fine ength; lo	SAND; ow tough	ark greenis medium p nness. rk greenisl low plasti	h gray;		MC- 25	- 115 116.5	11-16-22	2 38	18	16							000000000000000000000000000000000000000	PP: 3.25, 3.5 TV: 1.0 tsf	, 3.0 tsf
78.24 <b>=</b>	120		toughn	ess.			iow piasti	ory, row																
				(con	tinued	,					F	REPORT	TITL	.E									HOLE ID	
											E	BORIN DIST.	GR				ROUT	E	PC	OSTM	IILE		S0068F	?
1	Н	A igh-	LIFC Speed	Rail Au	IA uthori	ty	URS I	MM ARUF	MAD TWAP		(	PROJEC Califorr BRIDGE	nia H	ligh-	Spe   F	ed PREF		D BY				DAT 1-2		EET of 8

Cali	<b>fornia</b> SED BY	Hig	h-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE	BORE	HO	LE I	LOCA	ATION (La	at/Lo	na oi	r Nor	th/Ea	ast an	d Dat	um)		1;		77-00	4
SV			Oct-21-13 Oct-22-13	N18	98	742	.757	/ E640									S	00	68R	
			RACTOR/DRILLER D. Heavilin	IN-SIT	ר טד	res <sup>-</sup>	TING	i									1		ACE ELEVATION 24 ft (NAVD88)	
	ING ME		MUD ROTARY(5'-151.5')	DRILL D-1															HOLE DIAMETER	
			S) AND SIZE(S) (ID)	SPT F	- HAIV	1MEI												.0 in .MME	I ER EFFICIENCY, ERI	-
			PT(1-3/8"), ST(2-7/8") KFILL AND COMPLETION	1				) lbs, 30 DURING			•	ΛEΤ	ED D	DILLI	NC /I		- 1	8%	. DEPTH OF BORING	
	omete		WILL AND COMPLETION	READ			VI LIV	Not Re			NG		Not F			JAIL	1	51.5		
Elevation (ft)	© Depth (ft)	Material Graphics	Description CNI TV CAND (CNI)		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests	
			SILTY SAND (SM); very dense; dark greenish of moist; some fines; fine SAND.	gray;	I	SS- 26	122	26-32-36	68	18	9								Sampler slipped, drilled 6" resampled at 122'	
73.24	125		Poorly graded SAND with SILT (SP-SM); dense grayish gray; moist; few fines; fine to medium sinterbedded with layers of SANDY SILT (ML); I dark grayish green; moist; some SAND; fine Solow plasticity; medium high dry strength; low toughness.	SAND; nard;	X	MC- 27	125 126.5	28-29-28	57	18	11.5							000000000000000000000000000000000000000		NO: HSR13-57
68.24	130		SANDY SILTY CLAY (CL-ML); very stiff; dark greenish gray; moist; some SAND; fine SAND; medium plasticity; very high dry strength; low toughness; cemented nodules < 1/8" last 8" of sample.			SS- 28	130 131.5	11-16-16	32	18	18								PP: 3.0, 2.5, 4.25 tsf  Reacts with HCL	4/02/2014 - RED
68.24	135		SILT (ML); hard; dark greenish brown; moist; fe SAND; fine SAND; low plasticity; very high dry strength; low toughness.	ew	<u> </u>	MC- 29	135 136.5	14-19-24	43	18	14	94.4	101.4	25.2	32.6	0.4		000000000000000000000000000000000000	PP: 4.25, 4.25, 4.0 tsf TV: 0.15 tsf	
-58.24	140		SANDY SILT (ML); very stiff; dark greenish gra moist; some SAND; fine to medium SAND; hig strength; low toughness.															0000000000		
<u> </u>			(continued)					REPORT	TITI	F									HOLE ID	4
							E	BORINO DIST.	3 RI				ROUT	_	DC	STM	III E		S0068R	4
		- ^	LICODA ILA	ADUE											۲۷	IVI در	IILE		EA	
	H	JA ligh-	LIFORNIA Speed Rail Authority	OH-SHAD TO	TRAPY			PROJECT Californ BRIDGE N	ia H	igh-	Spe	ed PREF		D BY					ATE SHEET 7 of 8	

SV OC.21-1.3 Oct-22-13 N1898742_757 / E6409397.825 (NAD83 CA Z4) SQ068R SURFACE ELEVATION Gregg Drilling/D. Heavilin DRILLING CONTRACTORDRILER SUBJECT (NAD83) SURFACE ELEVATION 198.24 ft (NAVD88) DRILLING METHOD DRILLING METHOD DRILLING SURFACE ELEVATION 198.24 ft (NAVD88) BOREHOLE DIAMETER TYPE; AND SUZE(S) (ID) SPT HAMMER TYPE  Automatic, 140 lbs, 30-inch drop  READINGS Not Recorded Not Recorded Not Recorded Not Recorded Surface DIAMETER DIAMET	California LOGGED BY	Hiah	I-Speed Train Fresno to Bakersfield  BEGIN DATE COMPLETION DATE	BORF	HOI F	LOC	ATION (I	at/l ∩	ים מי	r Nor	th/Fa	st an	nd Dat	tum)		_ 1		<b>77-00</b>	3EK	
Size	SV		Oct-21-13 Oct-22-13	N189	9874	2.757	7 / E640	9397	7.82	5 (N	NAD	83 C	CA Z	4)		S	006	38R	/ATION	
AUGERIC/S-5, MUD ROTARY(9-151-5)  AUGUSTATE TYPES AND SEZES (10)  MO(2-127), SPT(1-387), ST(2-787)  Automatic, 140 lbs, 30-inch drop  AUGUSTATE DURING DRILLING  AND RECORDED  GROUNDAYANTER DURING DRILLING  AND RECORDED  GROUNDAYANTER DURING DRILLING  NOT Recorded  ST(3-15-15-15-15-15-15-15-15-15-15-15-15-15-	Gregg Dril	lling/D	). Heavilin			STING	j									1	98.2	4 ft (NA	AVD88)	
SAMPLER TYPE(S) (ID)  SPI HAMMER TYPE Automatic video is 30-inch drop RECONDIVATER DURING DRILLING AT ER DRILLING CASE TOTAL DEPTH OF BORNS RECONS RECONDIVATER DURING DRILLING AT ER DRILLING CASE TOTAL DEPTH OF BORNS RECONS Not Recorded  SPI HAMMER TYPE RECONS RECONDIVATER DURING DRILLING AT ER DRILLING CASE RECONS Not Recorded Not Recorded SPI HAMMER TYPE RECONS Not Recorded SPI HAMMER TYPE RECONS Not Recorded SPI HAMMER TYPE RECONS TOTAL DEPTH OF BORNS RECONS Not Recorded SPI HAMMER TYPE RECONS Not Recorded SPI HAMMER TYPE RECONS Not Recorded SPI HAMMER TYPE RECONS TOTAL DEPTH OF BORNS TOTAL DEPTH OF BORNS Not Recorded SPI HAMMER TYPE RECONS TOTAL DEPTH OF BORNS TOTAL DEPTH OF BORNS Not Recorded SPI HAMMER TYPE RECONS NOT RECORDED SPI HAMMER TYPE TOTAL DEPTH OF BORNS TO TAKE TO THE SPI HAMMER TYPE TO THE SPI HAMER TO THE SPI HAMMER TYPE TO THE SPI HAMER TO THE SPI HAMER TO THE SPI HAMER T				1		)													METER	
BORRING EACHTILL AND COMPLETION  GROUNDWATER DURING DRILLS. AFTER DRILLING (DATE TOTAL DEPTH OF BORRIS FEADNS)  Not Recorded  No	SAMPLER TY	YPE(S	) AND SIZE(S) (ID)	SPT H	IAMM	ER TY		. :	مام ط							H/	AMME		IENCY, ERI	
### Description    Part   Part											AFTI	ER D	RILLI	NG (	DATE			DEPTH	OF BORING	
- stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; medium toughness; weak cementation.  - stiff to hard; fine SAND; low plasticity; fine SAND; fine stiff to hard; fine stiff	Piezomete	er		READI	INGS		Not Re	cord	ded		١	Not F		rded		1	51.5	ft		
### Borehole terminated at a depth of 151.5 on 10222013.  Soil moisture indication should not be because samples became well during retrieval through rotaty method drilling fluid. Soil moisture indication should not be surface or free groundwater table.  See Borehole terminated at a depth of 151.5 on 10222013.  Soil moisture indication should not be surface or free groundwater table.  See Borehole Log Legand for soil classification chart and key to lest data aind sampler type.  See Borehole Log Legand for soil classification chart and key to lest data aind sampler type.  REPORT TITLE  BORNING RECORD  DIST. COUNTY ROUTE POSTMILE  BORNING RECORD  S0068R  EA  High-Speed Rail Authority  DATE SHEET	Elevation (ft)	Material Graphics	Description								200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)		PP: 3.5	Other Tests	
Borehole terminated at a depth of 151.5' on 10/22/2013.  Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.  See Borehole Log Legend for soil classification chart and key to test data and sampler type.  REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Rail Authority DATE SHEET	53.24 145			n	30 	141.9 141.9 C- 145	19-27-39			16	60.4	85.6					<u>0000000000000000000000000000000000000</u>	Reacts PP: 4.5	with HCL , 4.5, >5.0 tsf	
Soil moisture indicated as "wet" because samples became wet during retrieval through rotary method drilling fluid. Soil moisture indication should not be used as a definitive indication of a potential phreatic surface or free groundwater table.  See Borehole Log Legend for soil classification chart and key to test data and sampler type.  REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME CALIFORNIA High-Speed Rail Authority DATE SHEET	48.24 150		- hard; no cementation.			2		44	18	12.5							000000000	PP: 4.5	, 4.0 tsf	
REPORT TITLE BORING RECORD DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET	43.24 155		10/22/2013.  Soil moisture indicated as "wet" because samp became wet during retrieval through rotary meti drilling fluid. Soil moisture indication should no used as a definitive indication of a potential phr surface or free groundwater table.  See Borehole Log Legend for soil classification	hod ot be reatic	, 1		,													
BORING RECORD S0068R  DIST. COUNTY ROUTE POSTMILE EA  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET						1.	DEDOSE	T.T.	_									luo:	E ID	
CALIFORNIA High-Speed Rail Authority  PROJECT OR BRIDGE NAME California High-Speed Train BRIDGE NUMBER PREPARED BY DATE SHEET							BORIN	3 RI	ECC					-	2071			S00		
High-Speed Rail Authority    BRIDGE NUMBER   PREPARED BY   DATE   SHEET		7 A 1	ITODA II A										E	PC	JSTN	1ILE		EA		
High-Speed Rail Authority   BRIDGE NUMBER   PREPARED BY   DATE   SHEET		Al	LIFOKNIA LIRS HMM	ARLIP									 1							
	H	igh-	opeed Rail Authority	AH-SHADI TR	MPV					F	REP	ARE	D BY						SHEET 8 of 8	

NG			<b>1-Speed Train I</b> BEGIN DAT Oct-16-13		to Bakersfie COMPLETION Oct-17-13		N188	149	94.3	387	TION (L / E641	at/Lo 9516	ng or 6.72	Nor 8 (1	th/Ea	ist an 83 C	d Dat	um) <b>1)</b>		H	OLE IE	9AR
Greg DRILLI	gg Drii	lling/D				D	N-SITU	RIG		ING										1 BC	89.29 DREH	CE ELEVATION 9 ft (NAVD88) OLE DIAMETER
SAMPL MC(2	LER T' 2-1/2'	YPE(S	MUD ROTARY( ) AND SIZE(S) (ID T(1-3/8"), U(2-3 FILL AND COMPL	) 3/8")	5')	S		AMM nat	IER ic, ´	140	PE Ibs, 30			•	AFT		DILLI	NO /	DATE	H/	78%	in R EFFICIENCY, ERI DEPTH OF BORING
	ceme			ETION			EADIN				Not Re			NG		lot F	Reco				01.5	
Elevation (ft)	⇔ Depth (ft)	Material Graphics	QANDY I CI		cription				_	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	
84.29	5		SANDY lean CL/ little SAND; fine strength; no dilat cementation; occ  - very stiff; grayis SAND; fine SAND SILTY SAND (SM fine SAND.	SAND; mancy; higher saisonal with brown D; mediu M); loose	variegated with m plasticity. ; light olive bro ); medium den:	ty; high dry moderate AYEY SANE th gray; som wn; moist;	D.	<u> </u>	1C- 02	5 5 6.5	3-5-9	14	18	15	61.3	103.6	15.5	37.8	15.9			CBR, COMP, EI, RV Hand augered 5.0' below ground surface, pockets of mostly CLAY and SANDY, HCL fizzes vigorously with sample, potentially swelling CLAYS  Reacts vigorously to HCl PP: 4.5 tsf TV: 1.56 tsf
79.29	10						<u> </u>		03	11.5	6-12-16	28	18	14.5	-						MANAN	
74.29 69.29	15		SANDY lean CL/ brown; moist; littl plasticity; high dr toughness.	le to few	SAND; fine SA	ND; mediu		M	04	15	12-19-27	46	18	13		95	4.8				<u> </u>	DS
			(con	tinued)																		
		400	uros:							D	EPORT BORING IST.	G RI	UNT	Υ	F	ROUT	Έ	PC	OSTM	ILE		HOLE ID S0069AR EA
	H	JA ligh-	LIFORNI Speed Rail Au	A uthority	3	HMM ARL	P THA	P1			ROJECT Californ RIDGE N	ia H	igh-	Spe F	REF		D BY				DA <sup>-</sup>	TE SHEET 27-14 1 of 6

Calif	fornia	IAME <b>A High</b>	-Speed Train Fr	esno to	Bakersfiel	ld		01.5	100	•=:01:									1	315	CT NUMBER <b>77-00</b>	
NG	ED BY	ſ	BEGIN DATE Oct-16-13		MPLETION D oct-17-13					ATION ( 7 / E64										000	69AR	
Greg	gg Dri		ACTOR/DRILLER  ). Heavilin				-SITU		STING	i									1	89.2	CE ELEVATION 29 ft (NAVD88)	
			) MUD ROTARY(5	'-101.5'	)		71 (E		)											-3/4	IOLE DIAMETER in	
			AND SIZE(S) (ID)						R TY		O inc	h d.							- 1		ER EFFICIENCY, ER	i
			T(1-3/8"), U(2-3/8")							) lbs, 3				AFT	ER D	RILLI	NG (	DATE		'8% TAL	DEPTH OF BORING	3
		ent gr					ADIN			Not R					Not F				1	01.5		
		, l														(%)		(%				
		Material Graphics					1	nber	Sample Depth (ft)	.⊑ਂ	æ	(in)	<u></u>	(%	Dry Density (pcf)	Moisture Content (%)	(%)	Plasticity Index (%)		pot 4	5	
Elevation (ft)	Œ	al Gra					3	Sample Location	Dep	per 6 in.	N-Value (bl/ft)	Penetration (in)	ery (in)	200 Wash (%)	nsity	ပို	Liquid Limit (%)	ty In	(bst)	Drilling Method		
evati	Depth (ft)	ateria					9	mple	.   el	Blows	Value	netra	Recovery	0 Wa	y De	istur	l pini	astici	TXUU (	lling	ଯା ଅନୁ Remarks/	
Ш	_20 <u></u>	ž		Descri	iption		Ċ	က် SS	_	5-9-12				20	۵	Ĭ	Ĕ	Ë	Ě		Other Tests PP: 3.1 tsf	_
	Ξ							U 05		00.12			' '							000000000000000000000000000000000000000	1.1.2.1.2.	-
	Ξ						4	1	21.5							16.9	35.3	12.3		000	Munsell color 10YR/4	1/2
	=																				increased SAND con	
	Ξ																			000		
	Ξ																			MM		
	Ξ																					•
64.29	25—										ļ.,		ļ							000		
	=		<ul> <li>brown mottled/va SAND; medium pla</li> </ul>				ne	Д 06		5-8-8	16	18	15							000	HCL reacts vigorousl with gray mottled are LC	as.
	Ξ							1	26.5						112.5	19.0			UU 2251		PP: 2.8 tsf TV: 1.17 tsf	•
	Ξ																		2231	MMM		
	Ξ																					
	Ξ																					•
	_																					
	Ξ																					
59.29	30		- very stiff; brown v	ariegated	d and mottled	with grayis	sh	SS 07		5-6-8	14	18	15.5								PP: 3.5 tsf	•
	Ξ		brown with reddish low plasticity; med	um dry s	strength; slow	ineSAND; dilatancy.	)	\  °												000		
	Ξ		OANDY OUT (AU)	- P. C. 1		al'			31.5											3000		
	Ξ		SANDY SILT (ML); SAND; low plastici		wn; moist; me	edium		U- 08				30	13.5								6" of slough could no removed	t be
	=													55.9	109.8	17.3					DS	
	Ξ															17.3						
	Ξ								34.5											000		
54.29	35		SANDY SILTY CLA				v	MC		7-14-15	29	18	14	-						<u> </u>	Last 4" interbedded v	vith
	Ξ		and reddish brown SAND; high plastic	; moist; li	ittle to trace S/	AND; fine	<b>^</b>	09	'											0000	CLAYEY SAND	
	Ξ		high toughness.	,, mgm	, oa ongai, ii	unaturio	"	1	36.5						109.4	20.3			UU 2222		PP: 4.5 tsf	
	Ξ																			000	TV: 1.42 tsf	•
	Ξ				. – . – . – .															000		
	=		SANDY SILT (ML): variegated with rec	dish brov	wn; moist; high	h dry														000		
	Ξ		strength; no dilatar	ıcy; mica	ceous; varibly	SANDY.														000		
49.29	40-																					_
			(conti	nued)					1 -	)FD05		_									LIO! E ID	
									E	REPORT BORIN	G R	EC									HOLE ID S0069AR	
										DIST.	CC	TNUC	Υ	F	ROUT	Έ	PO	OSTM	IILE		EA	
	) (	CA	LIFORNIA Speed Rail Aut	4	URSIL	HMM ARLI				PROJEC						<b>.</b>	1					
	H	ligh-	Speed Rail Aut	hority	CALE	TORNE HON-SH	ARTO TWA			BRIDGE					PARE					DA	TE SHEET 27-14 2 of 6	 }

	ECT N. <b>fornia</b> ED BY		h-Speed BE	I Train	Fresi	no to B	<b>akersfi</b> PLETION	eld	BORFI	HOI	FI	OCA	TION (L	at/l o	na or	Nor	th/Fa	st an	d Dat	um)		1	OJEC <b>3157</b> OLE ID		BER	
NG			C	ct-16-	13		17-13		N188	314	94.	387	/ E641	9516	5.72	B (N	IAD	83 C	A Z	1)		S	006	9AR	/AT/01:	
			ACTOR/I D. Heavi		R				IN-SIT	U TE	≣ST	ING										- 1			VATION AVD88)	
	ING ME		D MUD R	OTAR'	Y(5'-1(	)1 5')			DRILL D-1 (																AMETER	
			S) AND SI		-	71.5)			SPT H	AMN	ИER											HA			CIENCY, ER	Ri
			T(1-3/8			N.							lbs, 30				ΛΕΤΙ	=D N	ווס	NG (	DATE		'8%	NEDTH	OF BORIN	G
	ceme			COM	LLTIO	•			READI				Not Re			10		lot R				1	01.5		OI BOININ	G
		"						,				_							(%)		(%	·				
Elevation (ft)	Depth (ft)	Material Graphics								Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		Remarks/	
Ш	40 <u> </u>	∑ 			D	escriptic	on			1 5	SS-	တိ 40	面 4-5-7	Ż		13.5	20	٥	Σ	<u>:</u>		Ĥ		(	Other Tests	_
			- SILTY	SAND	layer (2	" thick).					10	41.5					60.4						000000	PP: 3.2	25 tsf	-
			SANDY with red SAND.	CLAY	(CL); st own; litt	iff; grayis le grade	sh brown s to som	variegate e SAND;	d fine		U- 11	42			30	22		110.5	18.4	28	16					-
	🗒											44.5														-
14.29	45		reddish	brown; ty; high	some S dry stre	SAND; fir	variegate ne SAND w dilatar	; medium	I		/С- 12	45	7-9-9	18	18	13		102.7	20.0				00000	PP: 3.2 TV: 0.7		
39.29	45							ark reddis y strength				50	4-5-10	15	18	14		. • •	20.0				<u>0000000000000000000000000000000000000</u>	PP: 3.2	25 tsf	-
			brown ( some S strengtl	4/2) var SAND; fi n; no dil	iegated ne SAN atancy;	with red D; high p very high	olasticity; n toughne	wn; moist ; very high ess.	n dry 			51.5												4/2 Mu	nsell	-
						edium de le SAND		wn varieg	ated																	-
34.29	55										ЛС- 14	55 56.5	19-20-26	46	18	14	30.4	117.8	14.4				000000000000000000000000000000000000000	DS		-
29.29	60		some S	AND; fi	ne SAÑ	D; medii		e brown; icity; med ess.	– – – ium														000000000000			-
				(co	ntinue	d)						-												1		
												В	EPORT ORIN IST.	Ģ RI				OUT	E	PC	DSTM	IILE			.E ID 069AR	
<b>7</b>			LIFC Speed			rity	URS	HMM AF	SHALD TH	APV		C	ROJEC Californ RIDGE	ia H	igh-	Spe F	REP		D BY				DA1	TE 27-14	SHEET 3 of 6	3

	ECT N. <b>fornia</b> ED BY		n-Speed	I <b>Train Fr</b>	esno to	Bakersfield MPLETION DATE	BORE	HC	) F I	OCA	ATION (L	at/l o	na oi	· Nor	th/Fa	et an	d Da	tum)		1	ROJEC <b>3157</b> DLE ID	
NG			0	ct-16-13		ot-17-13	N18	81	494	.387	' / E641	951	6.72	8 (1	IAD	83 C	A Z	4)		S	3006	9AR
			ACTOR/E ). <b>Heavi</b> l				IN-SIT	TU T	ΓES	ΓING												DE ELEVATION  Oft (NAVD88)
DRILLI	ING ME	ETHO	D		101 51		DRILL													BC	DREH	OLE DIAMETER
	-			OTARY(5' ZE(S) (ID)	-101.5)		D-1	•	•	R TY	PE										5-3/4 i AMMEI	n R EFFICIENCY, ERI
MC(2	2-1/2"	), SP	T(1-3/8'	'), U(2-3/8							) lbs, 30						<b>5</b>	NO /	D.4.T.F		78%	
	HOLE Ceme			COMPLET	ION		READ			IER	DURING Not Re			NG		lot F				1	01.5	DEPTH OF BORING ft
							!															
Elevation (ft)	Depth (ft)	Material Graphics						Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/
Ξ.	-60 <u> </u>	E ∏V//			Descrip	otion		Sa	SS-	8 8 00	<u>9</u> 6-6-8	14		15.5	200	<u>.</u>	Mo	Lig	Ple	×		Other Tests Gray seam reacts
			- olive b	rown with g	ıray; high	dry strength.		X	15	61.5								28.1	5.8		000000000	vigorously with HCL
			variegat plasticit	ted with gra	y; trace S ncy; low to	y stiff; dark brown AND; fine SAND; lo o medium toughne: SANDY.	ow ss;															
24.29	65							Y	MC- 16	65 66.5	7-10-17	27	18	15		110.2	19.1	30	17			HCL reacts vigorously with gray mottled areas PP: 2.75 tsf TV: 1.42 tsf Cemented calcareous veins
19.29	70					D; medium plasticit lilatancy; low tough			SS- 17	70 71.5	8-10-10	20	18	17			21.4	32.8	11.5		) 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	PP: 3.5 tsf
14.29	75			prown mottl fine SAND;		eddish brown; little ic.		X	MC- 18	75 76.5	15-23-32	55	18	18		109.1	20.9	37	19		000000000000000000000000000000000000000	Maxed out pocket pen al three times PP: 5.0 tsf TV: 0.50 tsf
09.29	80		variegat	ted with dar coarse to fi	k gray; mone: trace o	ense; grayish brow oist; trace fines; m coarse SAND; nm parting of dark	edium														00000000000	
				(contin	nued)					1 -	NEDO ==	<b>T.</b>	_									LUQUETS
										E	REPORT BORING DIST.	Ģ R				ROUT	E	PO	OSTM	IILE		HOLE ID S0069AR EA
	Н	igh-	LIFC Speed	Rail Aut	hority	LIRS HMM I	ARLIP GH-SHAID T	TPAPV		(	PROJECT Californ BRIDGE 1	ia H	igh-	Spe F	ed REF		D BY				DAT 1-2	TE SHEET 27-14 4 of 6

	ECT N. F <b>ornia</b> ED BY			d Train EGIN DA Oct-16-			<b>akersfield</b> LETION DA 17-13		BOREI N188	HOL 314	E L 94.	OCA 387	TION (I / <b>E64</b> 1	at/Lo	ng o 6.72	r Nor	th/Ea	st an	d Dat	tum) 4)		<b>1</b>	<b>3157</b> DLE ID			
Greg	gg Dril		ACTOR/ ). Heav	DRILLEF				11	N-SITU DRILL	U TI	EST					`				-		SL 1	JRFAC 89.29	E ELEVA Oft (NAV	/D88)	
AUG	SER(0	)'-5'), l	MUD R	OTARY		)1.5')			D-1 (														5-3/4 i		LILK	
			-	IZE(S) (II					SPT H				PE Ibs, 30	) inc	h dr	on							AMMER 78%	R EFFICIE	ENCY, EF	Ri
				3"), U(2- D COMP		١							DURIN			•	AFT	ER D	RILLI	NG (	DATE	- 1		DEPTH O	F BORIN	G
Neat	ceme	ent gr	out					R	READII	NG	S		Not Re	ecore	ded		١	lot F	eco	rded		1	01.5	ft		
		6										_							(%)		(%					
Elevation (ft)	⊜ Depth (ft)	Material Graphics			D	escriptio	n					Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	R Oti	emarks/ her Tests	<b>.</b>
			SAND	Y lean C	LAY (CL		tiff; light bro	 own	. — —		SS- 19	80 81.5	18-23-16	39	18	11							000000000000000000000000000000000000000			-
04.29	85		some S	SAND; fir h; no dila	ne SAN	D; mediu	own and gra im plasticit toughness	y, high d	t; Iry		ИС- 20	85 86.5	16-21-24	45	18	5.5								HCL reac with gray PP: 2.6 ts TV: 0.90 t	ets vigorous mottled ar ef tsf	sly
99.29	90		SILTY gray; si	SAND (Some fine	SM); ver es; fine S	 y dense; SAND; m	grayish bro	own and	; <del>-</del> -		SS- 21	90 91.5	18-27-34	61	18	11										
94.29	95		- browr	ו; wet; lit	ttle fines	s; fine SA	ND; micac	eous.		X	22	95 96.37	30-48- 50/5.5"	98/6"	16.5	14							<u> </u>			
89.29	100			nes; fine	SAND.		dense; gra	ay; wet;																		-
				(co	ntinue	d)						Ι =			_									1	<u></u>	
												E	EPORT BORIN IST.	GR				ROUT	E	PC	DSTM	IILE		HOLE S006 EA		
	H	JA ligh-	LIFC Speed	ORN Rail A	IIA Author	rity	LRS H	MM ARL	LP TW	APV		C	ROJEC Califorr RIDGE	ia H	ligh-	Spe F	ed REF		O BY				DAT 1-2	E 7-14	SHEET 5 of	6

California		أماط												- 1	3157	T NUME <b>7-00</b>	)EK	
OGGED BY	High-Speed Train Fresno to Bakersf BEGIN DATE COMPLETION				ATION (La									HC	OLE ID	7-00		
NG	Oct-16-13 Oct-17-13				7 / E6419	9516	5.72	8 (N	IAD8	83 C	A Z	1)				9AR		
	ONTRACTOR/DRILLER ling/D. Heavilin	IN-SIT	U TE	STING	i												/ATION AVD88)	
ORILLING ME		DRILL	RIG											_			METER	
	-5'), MUD ROTARY(5'-101.5')	D-1 (		)											5-3/4 i			
SAMPLER TY	PE(S) AND SIZE(S) (ID)	SPT H.												H/	AMMER		CIENCY, EF	₹i
	), SPT(1-3/8"), U(2-3/8")				) lbs, 30			-						- 1	78%			
Neat ceme	BACKFILL AND COMPLETION	GROU   READI		ATER	DURING			IG /						1	01.5 1		OF BORIN	IG
iveat cerrie	in grout				Not Re	COIG	leu			IOL F	Reco	ueu		+ '	1.5			
Elevation (ft)	Material Graphics Description		Sample Location		Blows per 6 in.	% N-Value (bl/ft)	₽ Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	☐ Drilling Method Casing Depth	C	Remarks/ Other Tests	3
			23	101.5			10								MANNA			
<b>1</b>	Borehole terminated at a deph of 101.5 10/17/2013.	5' on																
	See Borehole Log Legend for soil class and key to test data and sampler type.	sification chart																
4.29 105																		
1.29 103																		
-																		
=																		
9.29 110																		
1 =																		
=																		
1.29 115																		
=																		
=																		
=																		
9.29 120																		
				-	REPORT	TITL	_									HOLI	EID	
					BORING			DRD								S00	)69AR	
					DIST.		UNT			OUT	Ε	PC	STM	ILE		EA		
<b>(2)</b>	CALIFORNIA Ju	HMM ARUP		F	PROJECT	OR	BRII	OGE I	NAM	E								
	igh-Speed Rail Authority			(	Californ	ia H	igh-	Spe	ed 7	Trair								
п	ign-speed Kall Aumorny	ALFLERY HON-SHILL TH	n.FV	E	BRIDGE N	IUME	BER	P	REP.	ARE	D BY				DAT	E 27-14	SHEET 6 of 6	6
								J	. DC	orgh	୯ଧା				1-2	1-14	1 0 01	U

	ECT N <b>fornia</b> ED BY		-Speed Train Fresr BEGIN DATE	no to Bakersfield COMPLETION DATE	BORE	HOLI	= 1.00	CATIO	N (1 :	at/l or	na or	Nor	th/Fa	ıst an	d Dat	tum)		1		T NUMBER 7-00
SV			Sep-30-13	Oct-01-13	N188	3719	96.95	54 / E	6416	6168	3.96	4 (N	NAD	83 C	:A Z	4)		S	006	
Greg	gg Dri	lling/E	. Santellan				.51 IN	iG										1	91.93	3 ft (NAVD88)
		ETHOE )'-5'). F	OTARY(5'-101.5')		DRILL D44	RIG													REH -7/8 i	OLE DIAMETER
SAMPL	LER T	YPE(S)	AND SIZE(S) (ID)		SPT H						_							HA	MME	R EFFICIENCY, ERI
			$\Gamma(1-3/8")$ , ST(2-7/8")		GROU			40 lbs					AFT	ER D	RILLI	NG (	DATE	1	5% TAL 1	DEPTH OF BORING
Neat	ceme	ent gro	out		READI					cord				Not R	Reco			1	01.5	ft
Elevation (ft)	Oepth (ft)	Material Graphics		escription		_	Sample Denth (#)		Blows per 6 In.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	
	,		SANDY lean CLAY (CI some SAND; medium high toughness.	_); loose; grayish brown; ı plasticity; low dry strength	moist; h;						60	60	33.5						222222	COMP, RV Hand augered down to 5 below ground surface
86.93	5		moist; few SAND; high high toughness. Fat CLAY with SAND (	; very stiff; grayish brown; plasticity; high dry streng CH); very stiff; grayish bro	gth; own;		C- 5 2 6. J- 6.	5 4-7	7-10	17	18	18		105.8 102.3 94.4	20.7		55 35.2	UU 2624		PP: 4.25, 3.5, 4.0 tsf TV: 1.06 tsf
			high toughness; freque (1/4"-1/8" diameter).	n plasticity, high dry streng ent cemented nodules f, olive brown; moist; som			8.	5											<u> </u>	Shelby pushed to 700 ps CONSOL PP: >5.0 tsf TV: 0.75 tsf
81.93	10					S	S- 10 3		6-5	11	18	18	55.7		19.1				( )	
76.93	15			_); very stiff; olive brown; ry strength; low toughness		<b>Д</b> М		5 5-9	9-10	19	18	15							000000000000000000000000000000000000000	PP: 4.0, 3.5, 3.5 tsf TV: 0.30 tsf
				rdium dense; olive brown tle to some fines; fine SAI			16	5.5						110 108.9		32.8	10.6	UU 2904	000000000000000000000000000000000000000	-
71.93	20																		MM	
			(continue	d)																
								REPO BOF DIST.	RINC	3 RE				ROUT	E	PC	DSTM	IILE		HOLE ID S0069R EA
	H	CAL	IFORNIA ipeed Rail Author	CALFORNA MG	H-SHAD TW	N.FV		PROC Calif	forni	a Hi	gh-	Spe F	ed REP		D BY				DA1	TE SHEET 27-14 1 of 6

PROJE <b>Calif</b> LOGG	fornia	ı Higl	h-Speed Train Fro	esno to Bakersfield COMPLETION DA	d ATE BO	REHO	DLE I	LOCA	ATION (L	at/Lo	na oi	r Nor	th/Ea	ast an	ıd Da	tum)		1	3157 OLE ID		
SV DRILLI	ING C	ONTR	Sep-30-13 ACTOR/DRILLER E. Santellan	Oct-01-13	N <sup>-</sup>		196	.954	/ E641									SU	006 JRFAC		
DRILLI AUG	ING M	ETHO)'-5'),	D ROTARY(5'-101.5	5')	D <sub>4</sub>													BC 4	)REHC -7/8 ir	DLE DIAMETER n	
MC(2	2-1/2' HOLE	'), SF BACK	S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/ FILL AND COMPLET COUT		Aı GR		atic,	140	) lbs, 30	G DR	RILLIN	-		ER D				8 TC	35%	R EFFICIENCY, ERI DEPTH OF BORING It	
Elevation (ft)	ն Depth (ft)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
				ND (CL); brown; moist;	; little	<u> </u>	SS- 05	20 21.5	8-11-16	27	18	9.5									
66.93	25		SAND; low plasticit  SANDY SILTY CLA little SILT; occasior of wood).	y. Y (CL-ML); olive brown; al organics (3/4" diame	r; moist; eter piece		U- 06	24			24	22.5		101.1	18.5	23.5	4.5		000000000000000000000000000000000000000		
61.93	30		some fines; fine SA	ND (CL); stiff; olive bro		X	MC- 07	29	12-11-11	22	18	17							000000000000000000000000000000000000000		
56.93	35			Y (CL-ML); very stiff; br nedium plasticity; low di		 n;	SS- 08	35	10-13-8	21	18	9							<u> </u>		
				medium dense; brown; ND; subrounded to rour		X		36.5					37.8		15.3				<u> </u>		
51.93 <u></u>	<del>-4</del> 0	11111	(contin	ued)					1		1										
								E	REPORT BORING DIST.	Ģ RI				ROUT	E	PO	OSTM	IILE		HOLE ID S0069R EA	
	H	CA ligh-	LIFORNIA Speed Rail Auth	urs H	MM ARLIP	TO THAP			PROJECT Californ BRIDGE N	ia H	ligh-	Spe	ed REF		D BY				DAT 1-2	TE SHEET 7-14 2 of 6	

Calif Cogg SV			h <b>-Speed Train Fres</b> BEGIN DATE Sep-30-13	no to Bakersfield COMPLETION DAT Oct-01-13		HOL 871	E L 96.	OCA 954	TION (L / E641	at/Lo	ng oi	Nor	th/Ea	ist an 83 C	d Dat	tum)		<b>1</b>	3157 3157 DLE ID 3006	)
Greg DRILLI	gg Dr ING M	illing/E /IETHO			IN-SIT			ING										SL 1	JRFAC 91.93	CE ELEVATION 3 ft (NAVD88) OLE DIAMETER
SAMPL MC(2	LER 1 2-1/2	YPE(S	ROTARY(5'-101.5') 3) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8	')		mat	tic,	140	lbs, 30									H/ 8	35%	R EFFICIENCY, ERI
		BACK ent gr	FILL AND COMPLETIC Out	N	GROL READ				DURING Not Re			IG		ER D				1	01.5	DEPTH OF BORING ft
Elevation (ft)	Depth (ft)	Material Graphics		Description			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests
			fines; micaceous.  Lean CLAY (CL); very	n variegated with black;  v stiff; olive brown; mois edium plasticity; medium ess.	st; few		/IC- 09	41.5	19-20-13	33	18	15							000000000000000000000000000000000000000	
46.93	45		with reddish brown; n	CL); very stiff; brown mo noist; some SAND; fine edium dry strength; high	SAND;		3S- 10	45 46.5	7-9-13	22	18	14								
41.93	50		- high dry strength; lo	w toughness.			/IC- 11	50 51.5	7-10-13	23	18	16.5		108.5 110.3		27.5	9.9	UU 2054		PP: 3.75, 2.25, 3.75 ts TV: 0.63 tsf
36.93	55		SANDY SILT (ML); ve SAND; fine SAND; m toughness.	ery stiff; olive brown; mo edium dry strength; high	oist; few h		SS- 12	55 56.5	6-6-8	14	18	9.5		101.2	18.2	32.2	8.5			PP: 4.5 tsf
31.93	60																			
			(conunu						EPORT			·								HOLE ID
								_	SORING IST.		ECC			ROUT	E	PC	DSTM	IILE		S0069R EA
		CA High-	LIFORNIA Speed Rail Autho	URS HMN	M   ARLIP	PAPI		C	ROJECT Californ RIDGE I	ia H	igh-	Spe F	ed REP		O BY				DAT 1-2	TE SHEET 27-14 3 of 6

	ECT NAME <b>fornia Higl</b> ED BY		DEAKERSFIELD  DIAMPLETION DATE  Doct-01-13					TION (L / E641									<b>1</b>	31577 DLE ID 30069		_
ORILLI Greg		ACTOR/DRILLER E. Santellan	-	IN-SIT	U TE	EST									,		SL 1	JRFACE 91.93	E ELEVATION ft (NAVD88) LE DIAMETER	_
AUG	SER(0'-5'),	ROTARY(5'-101.5')		D44													4	-7/8 in	1	
		) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8")		SPT H Auto				PE Ibs, 30	-incl	h dro	р							AMMER 85%	EFFICIENCY, ERI	
ORE	HOLE BACK	FILL AND COMPLETION			ND\	WA	TER	DURIN	3 DR	ILLIN	-						1		EPTH OF BORING	
Neat	cement gr	out		KEADI	ING	<u>э</u>		Not Re	cord	led			Not F	Reco	ded		1	01.5 ft	•	_
Elevation (ft)	Depth (ft)  Material Graphics	Descr	iption			୍ଦି Sample Number	Sample Depth (ft)	Blows ber 6 in.	N-Value (bl/ft)	⊋ Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
						13	61.5	20-32-42	74	10	15.5									-
26.93	65	Lean CLAY with SAND (CL moist; little SAND; fine to m plasticity; medium dry stren	nedium SAND; low	rown;		SS-	65	6-13-9	22	18	10	42.7								•
		SILTY SAND (SM); medium fine to medium SAND; subr	n dense; brown; mois ounded to rounded.	<del>t;</del> ——		14	66.5	0-13-9	22	10	10	42.7						<u> </u>		
21.93	70	- very dense; light yellowish black; wet.	•			MC- 15	70 71.5	24-30-45	75	18	17.5	21.4		19.6						
16.93	75—	Lean CLAY (CL); very stiff; SAND; fine SAND; medium strength; medium toughnes seams.	plasticity; medium d	ry		SS- 16	75 76.5	8-11-15	26	18	7.5							<u> </u>		
11.93	-80	(continued)																		-
		· · · · · · · · · · · · · · · · · · ·						EPORT											HOLE ID	_
							_	ORINO		ECC			ROUT	E	PC	DSTM	ILE		S0069R EA	
1	CA High-	LIFORNIA Speed Rail Authority	CALITORPA FIGA	RLP	APV		C	ROJECT Californ RIDGE 1	ia H	igh-	Spe P	ed REF	Trair	D BY				DATE	SHEET 7-14 4 of 6	

	ECT N. <b>fornia</b> ED BY		n-Speed Train Fres BEGIN DATE Sep-30-13	no to Bakersfield COMPLETION DA Oct-01-13					ATION (La									<b>1</b> ;	0JEC 3157 DLE ID 006	1	
Greg		lling/E	ACTOR/DRILLER E. Santellan		IN-SI	TU T	TEST					•				-		SU 19	RFAC 91.93	E ELEVATION  B ft (NAVD88)  DLE DIAMETER	
AUG SAMPI MC(2 BORE	SER(0 LER T' 2-1/2'	'-5'), YPE(S '), SP BACK	ROTARY(5'-101.5') ) AND SIZE(S) (ID) 'T(1-3/8"), ST(2-7/8' FILL AND COMPLETIO	) N	SPT I	HAN oma	MMER atic,	140	PE ) lbs, 30 DURING Not Re	3 DR	ILLIN			ER D	Reco			4- HA 8:	-7/8 i MMEF 5%	n R EFFICIENCY, ERI DEPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics	ſ	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	80		- hard; olive brown wit SAND; low dry strengt	h calcareous nodules	s; little		MC- 17	80	18-29-41			15.5			-			•	<u>                                     </u>	TV: 1.88 tsf PP: >5.0 tsf	
06.93	85		SANDY SILT grades t stiff; grayish brown; m plasticity; low dry stre micaceous.  SILTY SAND (SM); ve little fines; fine SAND;	oist; fine to medium sight; low toughness;	SAND; low	X	SS- 18	85 86.5	5-14-32	46	18	11	51.7						100000000000000000000000000000000000000		
01.93	90					X	MC- 19	90	24-37-58	95	18	15.5							20		
96.93	95		- grayish brown with b SAND.	lack seams; fine to n	nedium		SS- 20	95 96.5	19-30-26	56	18	11	19.7		15.4				000000000000000000000000000000000000000		
91.93	100		(continue	ed)																	
								E	REPORT BORING DIST.	3 R	E ECC UNT			ROUT	E	PC	OSTM	ILE		HOLE ID S0069R EA	
	H	CA ligh-	LIFORNIA Speed Rail Autho	rity URS H	MM ARLP	TVAP			PROJECT Californi BRIDGE N	ia H	igh-	Spe	ed <sup>-</sup> REP	IE Trair PARE orgh	D BY				DAT 1-2	E SHEET 77-14 5 of 6	

PROJ	ECT N	AME																						IUMBE	R	
LOGG	<b>fornia</b> SED BY	High	-Speed BF	I Train GIN DA	<u>  Fres</u>	no to l	Bakers	<b>sfield</b> ON DATE	BORE	HOLF	LOCA	ATION (L	at/I o	na or	· Nort	h/Fa	ıst an	d Dat	tum)			<b>315</b> DLE	<b>77-0</b> ID	0		
SV			S	Sep-30-	-13		t-01-13		N18			/ E641									- 1		69F	3		
			ACTOR/I		R				IN-SIT	U TES	TING										- 1			LEVA		
	JY DIII JNG ME	-	. Sante	ilai i					DRILL	RIG														`	D88) ETER	
			ROTAR	Y(5'-1	01.5')				D44												1 '	-7/8				
			) AND SI							IAMME			امد: ۱	h dr										FFICIE	NCY, ER	Ri
			T(1-3/8 FILL AND									lbs, 30				AFTI	FR D	RILLI	NG (	DATE		35% OT AI		TH O	F BORIN	G
	t ceme			, 001111	LLTIO				READ		L \	Not Re						Reco				01.5		1110	DOM	
																		(%)		(9)						
		Material Graphics								tion	Sample Depth (ft)	Ċ.		(C)			(Jod	Moisture Content (%)	(%	Plasticity Index (%)		þ				
n (ft)	<u></u>	Grap								Num	Dept	ır 6 i	(bl/ft	i) uoi	, (in)	%) u	sity (	S	mit (	, Ind	sf)	/lethc	eptr			
Elevation (ft)	Depth (ft)	erial								Sample Location Sample Number	l ble I	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery	200 Wash (%)	Dry Density (pcf)	sture	Liquid Limit (%)	ticity	TXUU (psf)	lng ∧	Di L	_		
Ele	Оер	Mate				Descript	ion			Sam	Sam	Blow	×	Pen	Rec	200	Dry	Mois	Liqu	Plas	TXU	Drilling Method	Casi		emarks/ ner Tests	
	100		- dark g	ıray; rou	ınded S	SAND; m	nicaceo	us.		MC- 21	100	19-41- 54/5"	95/ 11"	17	15											
	$\equiv$									M	101.4											MMM				∄
	₹										101											$\triangleright$				=
	Ξ		Boreho 10/1/20	le termi )13.	nated a	it a depl	า of 101	.5' on																		Ξ
	$\equiv$																									
	Ξ			rehole L y to test				ssification	chart																	Ξ
	Ξ		uu	10 1001	aata a.		o. type																			- ∄
86.93	105																									
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	Ξ																									⋾
17																										∃
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SE.	Ξ																									= ₫
	Ξ																									
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81.93	110																									$\exists$
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76.93	115																									∃
70.93																										$\exists$
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5	Ξ																									$\equiv$
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	120																									_=
5																										
												REPORT BORIN			)RD									HOLE S006		
81.93 81.93 71.930												IST.		UNT		R	ROUT	Έ	PC	DSTM	IILE		_	ΞA	J. V	
6	20	ΊΔ	LIFC	)RN	JΙΔ			RS HMM	ARLIP			ROJEC														-
			Speed			rity	7	CALECHER 14	GH - SHALLD TH	VAPV		Californ RIDGE	ia H	igh-	Spe	ed <sup>-</sup>	Trair	າ D BY				D/	ATE		SHEET	
5.0.		3				7						יייוטפבו	4OIVIE	JER			orgh						-27-	14	6 of 6	6

Cali	fornia SED BY	High	n-Speed Train Fresno BEGIN DATE	to Bakersfield COMPLETION DATE	BORE	HOL	LE L	.OCA	TION (I	at/Lo	na oi	· Nor	th/Ea	st an	d Dat	um)		1		<b>77-00</b>		
SV		NTD	Oct-07-13	Oct-08-13	N18	640	81.	356	/ E642									S	007	70R	/ATION	
			ACTOR/DRILLER E. Santellan		IN-SIT	UI	ESI	ING										- 1		CE ELE\ 2 ft (NA	AVD88)	
	ING ME			E'\	DRILL D44		}														METER	
	-		MUD ROTARY(5'-101 s) AND SIZE(S) (ID)	.5)	SPT H		MEF	R TYF	PE										-7/8 MME		CIENCY, ER	li l
MC(	(2-1/2")	, SP	PT(1-3/8"), ST(2-7/8")						lbs, 30			•							5%			
	HOLE E t ceme		FILL AND COMPLETION out		GROU READ			ΓER	DURIN Not Re			IG		ER D Not F			DATE	1	)TAL 01.5		OF BORING	G
Elevation (ft)	Oepth (ft)	Material Graphics	SANDY SILT (ML); medi			7.7	ያ ሞ Sample Number	<ul> <li>Sample Depth (ft)</li> </ul>	Blows per 6 in.	N-Value (bl/ft)	8 Penetration (in)	8 Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Ciquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	COMP,	Remarks/ Dther Tests CORR, RV	
189.42			brown; moist; little SANE strength; medium toughr	iess.		800000000000000	01	5												below ( Borderl ML/CL-		е —
			SANDY CLAY (CL); stiff; little SAND; fine SAND; I strength; low toughness.  SANDY SILT (ML); medi brown; moist.	ow plasticity; very high o	dry		MC- 02	6.5	4-5-7	12	18	12		95.2	27.5			UU 3223	000000000000000000000000000000000000000	TV: 0.4	), 3.0, 4.0 tsf 0, 0.70 tsf	
	=																		000			
179.42	10		SANDY SILTY CLAY (CI brown variegated with re	ML); stiff; dark yellowi	 sh		SS- 03	10	4-3-5	8	18	12	61.9		20.5							Z+06/60/20
	=		low plasticity; very high d stratified with a layer of lo	ry strength; low toughne	ess;																	∃
179.42	15-		SILT.	3000 07 112 1 012 1 , 0011	.0	Ш																∃
1,75.42	15-						ИС- 04	15	6-12-10	22	18	16.5							1000	PP: 2.5 TV: 0.6	5, 1.5, 1.5 tsf 0 tsf	$\exists$
			SILTY SAND (SM); medi brown; moist; some SILT subrounded.					16.5											000000000000000000000000000000000000000			
	=																					$\exists$
174.42																						=
5			(continued)					15	EDOD	エリエ・	_									Luci		_
								Е	EPORT SORIN	G RI	ECC									_	15 ID 170R	
		e (Avr	UEOD\ ".4						IST.		UNT			ROUT	E	PC	STM	1ILE		EA		
	) HI	A	LIFORNIA Speed Rail Authorit	LIRS HMM A	RUP	TAP:		(C	ROJEC	iia H	igh-	Spe	ed	Trair		•			D.	-	OUEET	
200		9"	opeca kan Aumorn	7				B	RIDGE	NUM	3EK			PARE orgh					DA 1-2	1E 27-14	SHEET 1 of 6	3

	ECT NAME <b>fornia Hig</b> ED BY	<b>h-Speed Train Fres</b> BEGIN DATE Oct-07-13	no to Bakersfield  COMPLETION DATE  Oct-08-13					TION (L / E642									<b>1</b>	ROJEC   <b>3157</b>     DLE ID   <b>3007</b>		3ER 	
ORILLI Greg	gg Drilling/I ING METHO			IN-SIT	U T	EST					`				,		SL 1	JRFAC 94.42 DREHC	E ELE\ ? ft (NA DLE DIA	VATION AVD88) AMETER	
MC(2 BORE	LER TYPE(\$ 2-1/2"), SF	MUD ROTARY(5'-1' S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8" KFILL AND COMPLETIO ITOUT	)		ma IND	tic, WA	140 TER	PE Ibs, 30 DURING Not Re	3 DR	ILLIN				Recor			H/ 8	35%	R EFFIC	OF BOR	
Elevation (ft)	Depth (ft) Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	(	Remarks Other Tes	
69.42	25—	variegated with reddis SAND, low plasticity.  SILTY SAND (SM), m	ry stiff; dark yellowish brow h brown seams; medium to edium dense; dark yellowis ttle fines; mostly fine SANI	o fine		U- 05	22 25 26.5	6-8-13	21	18	14.5	62.9	99.3	12.7				000000000000000000000000000000000000000	Top of s CLAYE DS	sample eit Y SAND o	ner - r slough
64.42	30-	occasional coarse SA	ND; subangular to subrour	nded.		MC- 07	30 31.5	18-21-19	40	18	17		109.6	11.9					DS		
59.42	35	SILTY SAND (SM); gr reddish brown; some	ayish brown variegated with	<u>h</u> — —		SS- 08	35 36.5	7-6-6	12	18	9.5	40.2		12.4							
54.42┕	<u>-40</u>	(continue	ed)																		
		LIEODE II A					D	EPORT BORING DIST.	G RI	ECC	Y	F	ROUT	E	PC	OSTM	ILE		HOL S00 EA	E ID 070R	
	High-	LIFORNIA -Speed Rail Autho	rity CALETSHER HOS	-SHAD TH	AFV			ROJECT Californ RIDGE N	ia H	igh-	Spe F	ed REP		D BY				DAT 1-2	E 7-14	SHEE 2 of	

<b>Calif</b> .OGGI	ECT NAM <b>fornia h</b> ED BY						kersfield ETION DATE	BORE	HO	LE L	OCA	TION (L	.at/Lo	ng or	Nor	th/Ea	st an	d Dat	um)		<b>1</b>	<b>3157</b> DLE ID	7-00	MBER		_
Greg	ING CON	ng/E.	CTOR/D			Oct-0	D-13	IN-SIT	U T	EST		/ E642	.9/3	J.88	ı (l\	NAD	03 C	,A	+)		SU 1	94.42	E ELE 2 ft (N	EVATIO	8)	
	ING MET SER(0'-5			OTARY	′(5'-101	1.5')		DRILL D44		3											- 1	)REH0 -7/8 i		IAMET	ĒR	
SAMPL	LER TYP	PE(S)	AND SIZ	Œ(S) (IE	D)			SPT F						ll							HA	MMEF		ICIENC	Y, ERi	_
	2-1/2"), HOLE BA											lbs, 30				AFTI	FR D	RILLI	NG (	DATE		35% TAL F	DEPTI	H OF B	ORING	
	cemen			0011111	LLTIOIT			READ				Not Re					lot F				1	01.51		101 5	011110	
																		(%)		(%						
Elevation (ft)	Depth (ft)	Material Graphics			De	escription				Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		Rema Other		
									X	MC- 09	41.5	7-8-13	21	18	18	39.4	101.9	22.6				M	DS			-
49.42	45			h brown	; moist;	fine SAN	ery stiff; dark D; very high dr	 y		SS- 10	45 46.5	9-8-10	18	18	13				26.9	6.7		<u> </u>				
	50		Poorly g brown v SAND; s	arigated	l with da	rk gray; n	ense; dark yel noist; medium	lowish	X	MC- 11	50 51.5	22-37-45	82	18	16.5		104.4	18.7				00000000000000000000000000000000000000	DS			
39.42	55			AND; fin			llowish brown; h dry strength			SS- 12	55 56.5	7-5-7	12	18	7				35.2	8.9		<u> </u>	PP: >	<b>&gt;</b> 5.0, <b>&gt;</b> 5.0	), 5.0 ts	
34.42	-60		mottling	; moist;	few SAN	ND; fine S	vn with black SAND; medium um toughness		_																	-
				(coi	ntinued	)																				
											Е	EPORT BORIN IST.	G R				OUT	E	PC	DSTM	ILE			DLE ID 0070R	\ <u>-</u>	
	C. Hig	AL gh-S	IFO peed I	RN Rail A	IA uthori	ty	CALETONISA NO	ARLIP BH-SIME TO	TAPI		C	ROJEC Californ RIDGE	ia H	igh-	Spe F	REP		D BY				DAT 1-2	E 7-14		EET of 6	

PROJE <b>Calif</b> LOGG SV	fornia	a High	n-Speed Train Fres BEGIN DATE Oct-07-13	no to Bakersfield COMPLETION DATE Oct-08-13					TION (L. / E642									<b>1</b>	<b>3157</b> DLE ID		_
DRILLI Greg	gg Dri		ACTOR/DRILLER E. Santellan	00.00-10	IN-SIT	TU T	ES			010	J.00	1 (1)	*/7L/	JJ (	<i>,</i> , \ <i>L</i> '	r)		SL 1	94.42	CE ELEVATION  2 ft (NAVD88)  DLE DIAMETER	_
AUG SAMPL MC(2 BORE	ER(C LER T 2-1/2 HOLE	)'-5'), YPE(S "), SP	MUD ROTARY(5'-1 i) AND SIZE(S) (ID) IT(1-3/8"), ST(2-7/8' FILL AND COMPLETIC	")	D44 SPT H Auto	AAN Oma	IMER atic,	140	lbs, 30	G DR	ILLIN	-		ER D	Reco			4 HA 8	-7/8 i AMMEF 85%	n R EFFICIENCY, ERI	_
Elevation (ft)	Depth (ft)	Material Graphics	ı	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	-60					X	MC- 13	61.5	6-7-13	20	18	12		102.6	25.0			UU 1577	monno	Sandy cuttings from MC13 to SPT-14 PP: 1.25, 1.75. 1.5 tsf TV: 0.85 tsf	
29.42	65		CLAYEY SAND (SC); brown; moist; some C	medium dense; dark yell CLAY; fine SAND; micace	ous.		SS- 14	65 66.5	12-9-10	19	18	14							000000000000000000000000000000000000000		
24.42	70		brown; moist; fine SA dry strength; low toug	loose; dark yellowish bro	ery high	X	MC- 15	70 71.5	3-3-8	11	18	18	73.8		25.4					PP: 0.5, 0.5, 0.5 tsf TV: 0.60 tsf	
19.42	75		brown variegated with	(CL-ML); stiff; dark yellow n reddish brown; moist; m me SAND; low plasticity; toughness.	ostly		SS- 16	75 76.5	4-5-8	13	18	12	73.2		18.6				<u> </u>		
14.42	80		brown; moist; some fi	medium dense; dark yell nes; fine SAND; micaced	owish ous.																
			(continu	ed)				R	EPORT	TITI	E									HOLE ID	_
								E	BORING DIST.	3 RI				ROUT	E	PC	OSTM	IILE		S0070R EA	
	) (	CA ligh-	LIFORNIA Speed Rail Autho	URS I HMM	ARLIP	TRAFY			ROJECT Californ RIDGE N	ia H	igh-	Spe	ed REF		D BY				DAT 1-2	SHEET 7-14 4 of 6	_

PROJE Calif LOGG SV	fornia	a High		rain Fres NDATE 07-13	no to Bal COMPLI Oct-08	ETION DATE					ATION (L / E642									<b>1</b> :	<b>3157</b> DLE ID		
ORILLI	gg Dr	illing/E	ACTOR/DRII E. Santellar	LLER	OCI-00	υ <del>-</del> 13	IN-SI	TU <sup>-</sup>	TES			चा ऽ	9.00	1 (1)	vAD	03 C	,r\	+)		SU 1	94.42	E ELEVATIO 2 ft (NAVD8	8)
AUG SAMPI MC(2 BORE	ER(C LER T 2-1/2 HOLE	YPE(S	MUD ROT S) AND SIZE( PT(1-3/8"), F FILL AND CO	S) (ID) ST(2-7/8'	')		- 1	HAN Om:	MMEI atic,	140	lbs, 30	G DR	ILLIN	-		ER D				4 HA 8 ) TC	-7/8 i MMEI 5%	R EFFICIENC	Y, ERi
Elevation (ft)	Depth (ft)	Material Graphics		ı	Description			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Rema Other 1	
	80		reddish bro	an CLAY (C	CL); medium	n stiff; brown SAND; low pl Iness.	with asticity;		MC- 17	80 81.5	15-13-15		18	17			29.5		_	UU 2211	MANNAM	PP: 1.75, 1.25 TV: 0.45 tsf	, 1.5 tsf
09.42	85		SILTY SAN fines; fine S		ense; dark y	vellowish bro	m, little	<b>I</b>	SS- 19	84	12-18-22	40	18	10							<u>0000000000000000000000000000000000000</u>		
			little SAND	; fine SANI	D; low to me	rayish brown; edium plastic s; with calcite	city; very	_ <u>X</u>		86.5													
)4.42	90		- stiff.					X	MC- 20	90	17-19-23	42	18	18								PP: 3.75, 4.5, TV: 0.50 tsf	4.5 tsf
99.42	95					y; moist; little city; low toug		_ _ 	SS- 21	95	5-6-8	14	18	18				20.7			000000000000000000000000000000000000000	PP: 1.5, 1.5, 1	.75 tsf
			SANDY lea some SAN high tough	D; low plas	ticity; very l	ive gray; moi nigh dry strer il.	ist; ngth;			96.5								30.7	9.3		000000000000000000000000000000000000000		.75 tsf
94.42	100-	<u> </u>		(continu	ed)			_															
										E	REPORT BORINO DIST.	3 RI				ROUT	E	PO	DSTM	IILE		HOLE ID S0070R EA	
	) H	_A ligh-	LIFOR Speed Ra	il Autho	ority	URS HMM	ARLIP HOH-SHIE	TWAF			ROJEC Californ RIDGE I	ia H	igh-	Spe P	ed REF		D BY				DAT 1-2		ET of 6

	fornia SED BY		n-Speed BE	<b>d Trair</b> EGIN DA			o Bak OMPLE Oct-08		<b>ield</b> I DATE					ATION (I									<b>1</b>	<b>315</b> DLE II	<b>77-00</b> D <b>70R</b>		
DRILL Gre	gg Dril	lling/E	ACTOR/ E. Sante	DRILLE				J 1J		IN-SIT	TU T	ΓES			-010	J.00	' (1	עריי		,, \ <u>L</u> '	۲)		SI 1	JRFA 94.4	CE ELEV	AVD88)	
	ING MI SER(0		<sup>D</sup> MUD R	OTAR	Y(5'-	101.5	5')			DRILL D44		G											- 1	OREH -7/8		AMETER	
SAMP	LER T	YPE(S	) AND S	IZE(S) (	(ID)		,			SPT F	HAIV				<b>.</b>	مالم ما							H/	AMME		CIENCY, ER	Ri
			PT(1-3/8 FILL AN											lbs, 30			-	AFT	ER D	RILLI	ING (	DATE		35% OTAL	DEPTH	OF BORIN	G
	t ceme									READ				Not Re						Reco				01.5			
Elevation (ft)	S Depth (ft)	Material Graphics				Descr	ription				Sample Location	Sample Number	Sample Depth (ft)	-0-5-92 Blows per 6 in.	N-Value (bl/ft)	9 Penetration (in)	9 Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Diagram of the control of the contro	Remarks/ Other Tests	·
	<u> </u>										X	22	101.33	50/4"	10"	10	10										
	<b> </b>		Boreho 10/8/20	ole term 013.	inated	at a d	eph of	101.5	' on																		
	<u>=</u>			orehole y to test					ification	n chart																	
89.42	105																										=
	=																										=
																											=
	=																										=
	₫																										Ξ
84.42	110-																										
	=																										=
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79.42	115																										Ξ
																											=
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	=																										=
	=																										=
74.42	120																										
														REPORT BORIN			DRD	)							HOL S00	.E ID 070R	
		<b>~</b> ( <b>A</b> (1)	urc	\D.	11 A			٦					D	IST.	CO	UNT	Υ	F	ROUT	Έ	PC	DSTM	1ILE		EA		
			LIFC Speed				7	LIRS	HMM	ARLIP				ROJEC Californ	nia H	igh-	Spe	ed	Trair								
<u> </u>		iign-	speed	Kali /	HUTTIC	orny		70	ALEXANDE H	Marie - Sale William Ti	TO THE STREET		В	RIDGE	NUM	BER	F	PREF J. Bo	ARE orgh	D BY esi				DA 1-	TE 27-14	SHEET 6 of 6	6

	ECT N fornia		n-Speed Train Fres BEGIN DATE	no to Bakersfield	PODEL	101		004	TION (	-1/1 -		Nam	u. / -	-4	4 D-	4		1	3157	T NUMBE 77-00	ER 	
SV			Oct-08-13	COMPLETION DATE Oct-10-13	N185	41	82.	477	TION (L / E643	av L0 5478	3.34	1 (N	IAD	83 C	A Z	turn) 4)		S		71R		
			ACTOR/DRILLER :. Santellan		IN-SITU	J TE	EST	ING										- 1		CE ELEVA 2 ft (NA\		
DRILL	ING M	ETHO		51.5')	DRILL I	RIG	i											BC	REH	OLE DIAM		
			) AND SIZE(S) (ID)	51.5)	SPT H	٩MN	MER	TYF	PE										.0 in	R EFFICIE	ENCY, ER	
			T(1-3/8") FILL AND COMPLETIO	N					lbs, 30				ΔΕΤ	ER N	DILL	ING (	DATE	- 1	5%	DEPTH O	E BORINI	G
	omete		TILL AND COMIT LETTO		READI				Not Re					ot F				1	51.5		DOMIN	
		တ္လ				_		£							ıt (%)		(%)					
(#)		Graphics				Sample Location	Sample Number	Sample Depth (ft)	6 in.	J/ft)	n (in)	(in)	(%)	Dry Density (pcf)	Content (%)	Liquid Limit (%)	Plasticity Index (%)	_	Method	5		
Elevation	Depth (ft)	rial G				ole Lo	je	ole De	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery	200 Wash (%)	Densit	ture C	d Lim	icity I	J (psf)	DG Me	2		
Elev	Dept	Material		Description		Sam	Sam	Sam	Blow	e\-N	Pene	Reco	200 \	Dry [	Moisture	Liqui	Plast	TXUU	Drilling	R Ot	emarks/ her Tests	
			brown; moist; little SA	O (CL); medium stiff; dark ND; fine SAND; medium	-		B- 01	0			60	60							{	COMP, C Hand aug	ORR, RV gered to 5'	
			plasticity; high dry stre	ngth; medium toughness.		7000																
	=					000																•
	=					000																
	<u> </u>					2000																
						000		5														
37.22	5		FAT CLAY with SAND	(CH); stiff; olive brown; m	noist;		SS- 02	5	2-3-5	8	18	14							1000	DD: 1.5	1.5, 1.5 tsf	
	=		toughness.	, mgm ary oxiongxii, ion		$\mathbb{X}$		6.5							25.0	70	53		)(QQ	PP. 1.5,	.5, 1.5 (\$1	•
	=																		0000			•
																			<u> </u>			
	Ξ		reddish brown; moist;	L); stiff; brown mottled wit some SAND; fine SAND; l	low														M			
	Ξ		nodules.	ength; low toughness; cem	entea														100			:
32.22	10						ЛС- 03	10	3-5-8	13	18	15							)))))	PP: 2.0, 2 TV: 0.45	2.0, 2.25 tsf	f
	=					N'		11 5						94.8	27.7	48	28		2000	17.0.43	31	•
	Ξ							11.5											$\triangleright$			
	Ξ		SANDY SILT (ML); me	edium stiff; dark yellow bro															2000			
	Ξ		variegated with reddis fine SAND; medium p	h brown; moist; some SAN asticity; medium dry stren	ND;														)))))			
	Ξ		low toughness.																			
77.22	15						SS-	15	2-2-3	5	18	13							)))()	PP: 0.75,	0.75, 0.75	tsf
	15						04						64						<u>0000000000000000000000000000000000000</u>			
								16.5					04									
	Ξ																		1000			
			SILTY SAND (SM); mo	edium dense; dark gray; m	noist;														<u> </u>			
	Ξ																					
72.22	_20																		20			
			(continue	ea)				R	EPORT	TITI	E									HOLE	ID	
								В	SORING	G RI				ROUT	F	Þί	OSTM	III F		S007		
	> (	~ A I	LIFORNIA	URS HMM A	RUP				ROJEC						_							
		liah-	Speed Rail Autho	3	4-SHALLS THE	A		C	Californ RIDGE I	ia H	igh-	Spe	ed :						DA <sup>-</sup>	TC T	SHEET	
	- 10		- Poos Rail Molilo					B	KIDGE	v∪iVít	שבת			orgh						27-14	1 of 8	3

	ECT NAME <b>fornia Hig</b> l ED BY	h-Speed Train Fres BEGIN DATE Oct-08-13	no to Bakersfield COMPLETION DATE Oct-10-13		HOL 5418	E L 82.	OCA	TION (L / E643	at/Lo	ng o 8.34	r Nor	th/Ea	ast an	id Da	tum)		<b>1</b>	3157 DLE ID 3007	)	
RILLI		ACTOR/DRILLER E. Santellan		IN-SIT	U TE	EST			'		٠,				,		SL 1	JRFAC 92.22	DE ELEVATION  If (NAVD88)  OLE DIAMETER	
		D MUD ROTARY(5'-1:	51.5')	DRILL D44		i												)REHO '.0 in	OLE DIAMETER	
		S) AND SIZE(S) (ID)	·	SPT H						la ala							HA	AMMER	R EFFICIENCY, ERI	İ
	2-1/2"), SF	PT(1-3/8") (FILL AND COMPLETIO	N	1				lbs, 30				ΔFT	ER D	DILL	NG (	DATE	- 1	35%	DEPTH OF BORING	2
	ometer	II ILL AIND COMI LLTIO	IN.	READI				Not Re			10		Not F		•		1	51.51		,
														(%)		(9)				
Elevation (ft)	Depth (ft) Material Graphics	ι	Description				Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
						//C- 05	20	5-10-16	26	18	14		104.3	22.1				MANAMANA	DS	-
67.22	25	Poorly graded SAND v gray; moist; fine SAND	with SILT (SP-SM); dense	e; dark		SS- 06	25 26.5	8-14-20	34	18	10	14						<u> </u>		
52.22	30-		EL); very stiff; brown mottle oist; some SAND; fine Sa toughness.			ЛС- 07	30	8-12-16	28	18	14		103.3	21.3	42 39	28 24		<u> </u>	PP: 3.0, 3.0, 3.5 tsf TV: 0.20 tsf	
57.22	35-	SILTY SAND (SM); mobown variegated with sAND.	edium dense; dark yellow grayish brown; moist; fine	vish Ə		3S- 08	35 36.5	9-9-8	17	18	16	30						<u> </u>		
52.22	40	little SAND; finè SANE strength; medium toug																		-
		(continue	eu)				P	EPORT	TITI	F									HOLE ID	
							В	SORIN IST.	GR				ROUT	E	PC	OSTM	IILE		S0071R EA	
	CA High-	LIFORNIA Speed Rail Autho	rity CALECHEA H	ARLIP GH-SHADD TH	PAP4		C	ROJEC Californ RIDGE	ia H	ligh-	Spe F	ed PREF		D BY				DAT 1-2	TE SHEET 27-14 2 of 8	<u> </u>

<b>Calif</b> OGGI SV	<b>ornia</b> ED BY	ame L <b>High</b>		<b>d Trair</b> EGIN DA Oct-08-			<b>akersfie</b> PLETION I -10-13		BOREH N185	HOLI	E L0	OCA 177	TION (L / E643	at/Lo	ng o	r Nor	th/Ea	st an	d Dat	um)		<b>1</b>	3157 DLE ID	<b>7-00</b>	MBER	
RILLI	ıg Dril	lling/E	ACTOR/ E. Sante	DRILLE		001	10-13		N-SITU				7 2043	J-77	0.04	1 (1	WAD.	00 0	,,, <u>_</u>	<del>"</del> )		SL	JRFAC	E ELE	EVATION IAVD88)	
		ETHOI	D MUD R	ROTAR	Y(5'-1	51.5')			DRILL I	RIG													REHO	OLE D	IAMETER	
SAMPL	ER T	YPE(S	) AND S	IZE(S) (		,		S	SPT HA													H/	AMME	R EFF	ICIENCY, EF	Ri
			T(1-3/8		DI ETIOI	N							lbs, 30			•	ΔΕΤ	ER N	DILLI	NG (	DATE		35%	NEDTI	H OF BORIN	G
	omete		1 122 7 (1 4)	D OOM	LLTIO				READI				Not Re			•••			Recor			1	51.5		TOT BOTTIN	
								·											(%)		(%)	•				
Elevation (ft)	Depth (ft)	Material Graphics			С	Descriptio	on			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		Remarks/ Other Tests	
			- browi	n mottle	d with re	eddish b	rown; subi	rounded.		M	9	40	10-11-12	23	18	17		103.9	22.7				00000000000	DS		-
47.22	45		brown; GRAVI	; moist; † EL; suba	trace GF	RAVEL; ito subro		SAND; fine	,		0	45 46.5	13-18-22	40	18	12.5	14						<u>0000000000000000000000000000000000000</u>			
42.22	50		brown	with wh ines; fin	ite. redd	dish brow	n black gr D; subrou	rains: wet:	,		1	50	18-26-31	57	18	18	-	116.8	14.5				000000000	DS		
37.22	555		seams SAND; toughn	of redd ; nonpla ness.	ish brow stic plas	wn; moisi sticity; hig	t; some S/gh dry stre	; medium			2	55	5-8-19	27	18	13.5							000000000000000000000000000000000000000	PP: 1	.5, 1.5, 2.0 tsf	
32.22	60		Subrou	graded with red	SAND (	d. (SP); ver yellow b			· — —																	-
				100		/							EPORT												LE ID	
												В	ORIN	GR				ROUT	F	Pr	OSTM	II F		SO	0071R	
		- A I	HEC	ADA	11 A		Time:	LIMALATAR	I ID										_		, O 1 IVI					
1		A	LIFC	יואכ	AIN		1 LIKE	HMM ARL					ROJEC <sup>*</sup>						1							
V/	H	igh-	Speed	Rail /	Autho	rity	1 Car	FORFIA HOH-S	SPRED TWO	MPV			RIDGE			<u> </u>		ARE					DA	ΓE	SHEET	

LOGG SV DRILLI Greg	fornia ED BY ING CO	High ONTRA	n-Speed Train Fres BEGIN DATE Oct-08-13 ACTOR/DRILLER E. Santellan	no to Bakersfield COMPLETION DATE Oct-10-13		418	32.4	477	TION (L / E643									#C S SU 1	31577 DLE ID 6007 JRFAC 92.22	1R E ELEVATION 2 ft (NAVD88)	_
SAMPI MC(2 BOREI	ER(0 LER T 2-1/2'	'-5'), YPE(S '), SP BACK	O MUD ROTARY(5'-1 ) AND SIZE(S) (ID) T(1-3/8") FILL AND COMPLETIC	·		AMM mati	ic, VAT	140 [ER	lbs, 30	G DF	RILLIN	-		ER D	Reco			7 HA 8	.0 in AMMEF 85%	DLE DIAMETER  R EFFICIENCY, ERI  DEPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics	ı	Description	:	Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
127.22	70 75 75 75 75 75 75 75 75 75 75 75 75 75		SANDY lean CLAY (Cbrown; moist; some Splasticity, high dry structure)  SILTY SAND (SM/ML yellowish brown; moist micaceous.	CL); very stiff; dark yellowis SAND; fine SAND; medium		S 1	S-14 C-5 S-16	60 61.5 65 70 71.5 75 76.5	8-10-11 9-16-14	30	18	12 15	47	117.9	15.1				6660000000000000000000000000000000000	PP: 0.5, 2.0 tsf	
112.22	_80		(continu	ed)																	_
								В	EPORT BORING IST.	3 R				ROUT	E	PO	OSTM	IILE		HOLE ID S0071R EA	
	H	CA ligh-	LIFORNIA Speed Rail Autho	CALFORNA MO	RLP	A NEV		C	ROJECT Californ RIDGE N	ia H	ligh-	Spe	ed PREF		D BY				DAT 1-2	E SHEET 7-14 4 of 8	

<b>Calif</b> LOGG	ECT NAME <b>fornia Hiç</b> ED BY	gh-Speed Train Fresno to Bakersfield BEGIN DATE COMPLETION DATE					TION (La									<b>1</b>	1 <b>3157</b> OLE II	
SV DRILLI	ING CONT	Oct-08-13 Oct-10-13 RACTOR/DRILLER	N18 IN-SIT				/ E643	5478	3.34	1 (1	NAD	83 C	CA Z	4)				71R CE ELEVATION
Greg	gg Drilling	/E. Santellan														1	92.2	2 ft (NAVD88)
	ING METH	OD , MUD ROTARY(5'-151.5')	DRILL D44		G _												OREH 7.0 in	IOLE DIAMETER
		S) AND SIZE(S) (ID)	SPT F	HAIV												HA	AMME	R EFFICIENCY, ERI
		PT(1-3/8") KFILL AND COMPLETION					lbs, 30				۸ГТ		ווח	INIC /	ים אדו	1 1	35%	DEPTH OF BORING
	ometer	RFILL AND COMPLETION	READ				Not Re			NG		Not F			•	1	51.5	
			i															
Elevation (ft)	Depth (ft) Material Graphics	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests
				M	MC- 17	81.5	13-20-31	51	18	18		106	22.5			UU 2488	$\sim$	PP: >5.0, >5.0, >5.0 tsf TV: >0.20 tsf
07.22	85—	SANDY lean CLAY (CL); hard; brown to grayi brown; moist; some SAND; high plasticity, ce sands in clay.	sh mented		SS- 18	85 86.5	7-14-20	34	18	16								(Top) brown to grayish brown (btm) PP: 3.75, 5.0, >5.0, 4.0 tsf Vigorously reacts to HCL
02.22	90	Fat CLAY (CH); very stiff; grayish brown; mois SAND; fine SAND; high dry strength; low toug			MC- 19	90	9-16-19	35	18	16		04.6	28.7	58	41	UU		More SILT than CLAY? PP: 2.0, 2.0, 2.0 tsf TV: 0.20 tsf
97.22	95	- olive brown; very high dry strength; high toug	ghness.		SS- 20	91.5	6-12-15	27	18	13.5		94.0	20.7			2894	000000000000000000000000000000000000000	PP: 3.0, >5.0, >5.0 tsf
-92.22 <b>-</b>				X		96.5					93							
JL.22		(continued)																
						E	EPORT BORING IST.	3 RE				ROUT	E	P	OSTN	/ILE		HOLE ID S0071R EA
	CA High	LIFORNIA -Speed Rail Authority	HON-SHAD TO	NAPI.			ROJECT Californi RIDGE N	ia Hi	igh-	Spe   F	ed	ME Traii PARE orgh	D BY				DA 1-2	TE SHEET 27-14 5 of 8

	ECT N		<b>1-Speed T</b> BEGII	rain Fres	no to Bak	ersfield	BODE	-110		004	TION (	-1/1 -		. N.I	u. /= -	-1	1.0.1			1	3157	T NUMBI <b>7-00</b>	ER	
SV			Oct	-08-13	Oct-10		N18	:ноі 3541	LE L 182.	.477	TION (L / E643	at/L0 5478	ng or 3.34	1 (N	ın/Ea NAD	st an 83 C	u Dat AZ4	um) 4)		S	OLE 10 3007	'1R		
			ACTOR/DRI				IN-SIT	TU T	EST	TING												CE ELEVA 2 ft (NA\		
RILLI	ING M	ETHO			51 5'\		DRILL D44		3											ВС	DREH	OLE DIAN		
			) AND SIZE		31.3)		SPT H		MEF	R TYI	PE									_	'.0 in AMME	R EFFICIE	ENCY, ER	i
			T(1-3/8") FILL AND C	OMDLETIO	.NI						lbs, 30			•	ΛET	ED N	DILLI	NC /	DATE		35%	DEDTU O	F BORIN	
	omete		FILL AND C	OMPLETIO	'IN		READ			ILK	Not Re			10		Not R				1	51.5		F BORING	
										)							(%)		(%					
<b>£</b>		Graphics						ation	mber	pth (fi	Ë	( <del>L</del>	(in)	(in)	(%	(bct)	onteni	(%)	dex (		pod 4			
tion (	(#)	ial Gr						le Loc	le Nu	le De	per (	lq) ən	ration	ery (i	ash (	ensity	ure C	Limit	city In	(pst)	g Met			
Elevation	Depth (ft)	Material (		[	Description			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU	Drilling Method Casing Depth	R Ot	emarks/ her Tests	
$\exists$	100				some SANI	D; medium		14	MC- 21	100	12-33- 53/4"	86/ 10"	16	16			_		_	_				-
	=		SILTY SAI	ND (SM); ve	ery dense; gr	ayish brown; r			1	01.33	3													-
	=		ntuc inico,	inic to med	iidiii O/ (IVD,	weak cement	auon.														000			
	Ξ																				<u> </u>			
	105																							
37.22	105		- medium	dense; gray	ish brown w	ith 2" reddish			SS-	105	14-12-9	21	18	14						UU 2624	000			
	Ξ		brown laye	er at 106'; su	ubrounded to	o rounded.		M	22															
			variegated	reddish bro	ry stiff; grayi own; moist;	sh brown some SAND; f gth; low toughi	ine	Α		106.5														
	Ξ		SAND, NO	plasticity, ic	ow dry strent	giri, iow toughi	iess.																	
	=	///				 enish gray; m	 oist;	-																•
	=		trace SAN toughness		ID; high dry :	strength; high																		
32.22	110																				M			-
,2.22									MC- 23	110	9-12-15	27	18	18		87.2	34.1	63	47			PP: 4.25, TV: 1.44	3.5, 3.5 tsf tsf	
	Ξ							Λ		111.5						91.2	31.3			UU 2624				-
	=																							•
	Ξ	///						_																
	Ξ					gray; moist; fir gth; low toughi															<u> </u>			
	Ξ																							-
77.22	115								SS- 24	115	17-23-19	42	18	9								PP: 1.75,	2.75, 2.5 ts	sf -
	=							A		116.5					85									-
	115							$\sqcap$		110.5														-
																					<u> </u>			
	Ξ																							
	Ξ		Fat CLAY	(CH); very s	stiff; grayish	brown; moist;	 trace	$\dashv \mid$													000000000000000000000000000000000000000			-
72.22 <b>-</b>	120-		SILT; high		ery high dry	strength.																		
				(continue	ed)						EPORT	ידודי	F									HOLE	ID	
										E	ORIN	Ģ RI	ECC			OUT.	_	D/	30T#	W F		S007		
		~ A		N II A		LIRS HMM A	ARI ID				IST.		UNT			ROUT	_	1	OSTM	IILE		EA		
		JA.	LIFOR Speed Ro	AINIA	4	To letter				(	ROJEC <sup>*</sup> Californ	ia H	igh-	Spe	ed i	Trair					1			
4		iign-	speed Ko	III AUTO	illy	LALEDSHI HO	e - Salvada T	TEMP		B	RIDGE	NUM	BER			PAREI orgh					DA <sup>-</sup>	ΓΕ 27-14	SHEET 6 of 8	3

	ECT NAME	: <b>gh-Speed Train Fres</b> BEGIN DATE	no to Bakersfield	BODE			004	TION! /	- 1.71 -			U- /E-		1.0-	1		1	3157	
SV	SED BY	Oct-08-13	COMPLETION DATE Oct-10-13					TION (L / E643										OLE 10 3007	
Greg	gg Drilling	RACTOR/DRILLER I/E. Santellan		IN-SIT			ING										1	92.22	CE ELEVATION 2 ft (NAVD88)
	ING METH SER(0'-5')	IOD ), MUD ROTARY(5'-1	51.5')	DRILL D44		3												OREH 7.0 in	OLE DIAMETER
SAMP	LER TYPE	(S) AND SIZE(S) (ID)	,	SPT H													H	AMME	R EFFICIENCY, ERI
		SPT(1-3/8") CKFILL AND COMPLETIO	INI					lbs, 30				ΛEΤ	ED N	ו וום	INIC /	ידארו/	- 1	35%	DEPTH OF BORING
	ometer	or ice may down terro	14	READ				Not Re			•••		Not F			-	1	51.5	
														(%)		(9)			
Elevation (ft)	Depth (ft) Material Graphics	1	Description		Sample Location	_	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests
							120 121.5			18	0							MANNA	
	-//				M	MC- 25	122	8-10-15	25	18	18	-	85.1	35.3	51	32	UU	MANNA	PP: 4.0, 4.5, 4.5 tsf
					<b>M</b>	1	123.5										2582	MANAGORA	CONSOL, SG
67.22	125	- stiff; greenish black;	organic odor.			SS- 26	125	6-10-10	20	18	18	-							TV: 0.85 tsf
					Δ	1	126.5											DODDODD	ORG Grayish brown in shoe PP: 1.75, 2.25, 2.25 tsf
62.22	130-	- grayish brown.				MC- 27	130	14-20-25	45	18	17.5								PP: >5.0, >5.0, >5.0, 4.5
					M	1	131.5						94.6	28.0	51	35	UU 5261		TV: 0.25, 0.30 tsf
		CLAYEY SAND (SC); moist; little CLAY; fine subrounded.	very dense; dark greenisle to medium SAND;	h gray;															
57.22	135					28	135 136.5	23-24-26	50	18	9.5							000000000000000000000000000000000000	
			with SILT (SP-SM); very d fines; fine to medium SAN		_!													DOODDOODDOOD	
52.22 <b>-</b>	14U	(continue	ed)																
							E	EPORT BORING DIST.	3 RI				ROUT	E	P	OSTN	/ILE		HOLE ID S0071R EA
	CA High	ALIFORNIA n-Speed Rail Autho	urs HMM I	ARUP GH-SHALD TI	TAPE .			ROJECT Californ	ia H	igh-	Spe	ed PREF		D BY				DA	TE SHEET 27-14 7 of 8

Californ		-Speed Train Fresn	o to Bakersfield														∣ 1	3157	7-00	DEK	
	BY	-Speed Train Fresn BEGIN DATE Oct 09 13						TION (La									HC	OLE ID	)		
SV	CONTRA	Oct-08-13	Oct-10-13	N18				/ E643	04/8	5.34	1 (1	NAD	83 C	,Α <b>Ζ</b>	4)			IREAC	'1R DE ELEV	ATION	
		. Santellan		114-011	0 1	.5111	NG										- 1		2 ft (NA		
DRILLING				DRILL	RIG												BC	DREH		METER	
		MUD ROTARY(5'-15	1.5')	D44			T) (D											'.0 in	D EEE10	IENOV ED:	
		AND SIZE(S) (ID) T(1-3/8")		SPT H. Auto				'⊨ Ibs, 30	-incl	h dr	go							ammei 35%	REFFIC	IENCY, ERI	
		FILL AND COMPLETION		GROU	NDW	/ATE		DURING				AFT	ER D	RILLI	ING (	DATE			DEPTH (	OF BORING	;
Piezome	eter			READI	NGS			Not Re	corc	led		1	Not F	Reco	rded		_ 1	51.5	ft		
Elevation (ft)	Material Graphics	De	escription		M	C- 1		Blows ber 6 in.	% N-Value (bl/ft)	⊖ Penetration (in)	D Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	C	Remarks/ other Tests	
47.22 145-		some SILT; little SAND low toughness.	stiff; dark greenish gray; n ; fine SAND; high dry stre	ength; — — —		S- 1-	45	6-8-9	17	18	13	-		25.8	43	25		<u> </u>	PP: 4.0	, 2.75, 3.5 tsf	
42.22 150-		moist; little SILT; fine S micaceous.	AND; weak cementation;		м 3	1	50	15-31-34	65	18	10							000000000000000000000000000000000000000			
-	∃	Borehole terminated at	a deph of 151.5' on																		
37.22 155 <b>-</b>		10/10/2013.  See Borehole Log Lege and key to test data and	end for soil classification disampler type.	chart																	
<b>_</b> 32.22 <b>_</b> 160 <b>_</b>								EPORT ORING			ORF.	 )							HOLI S00	E ID 071R	
								ST.		UNT			ROUT	Έ	PC	DSTM	1ILE		EA		
	CAI	<b>IFORNIA</b>	URS HMM A	RUP			PE	ROJECT	OP	BRII	)GF	NAN	1=								
	U.A.	AIN OKI NIA	7	-			C	aliforni	а Н	igh-	Spe	ed	Trair								
	righ-S	peed Rail Author	CALETONNA HO	H-SHAD TH	NPV		BF	RIDGEN	IUME	BER	F	PREF	PARE orgh	D BY				DAT	ГЕ 27-14	SHEET 8 of 8	
												<u>ر. D</u>	orgii	ଦଧା				1-2	. / - 14	1 0 01 0	

Calif	ECT NA <b>fornia</b> ED BY	High	n-Speed Train Fres BEGIN DATE	no to Bakersfield COMPLETION DATE	BOREL	101 F	FIC	ОСА	TION (L	at/I o	na o	· Nor	th/Fs	ast an	nd Da	tum)		1		T NUMBER 77-00	_
SV			Oct-01-13	Oct-07-13	N184	1993	30.7	'59	/ E643									S	3007	72R	
Greg	gg Drill	ling/E	ACTOR/DRILLER E. Santellan		IN-SITU		STI	NG —										1	96 ft	CE ELEVATION (NAVD88)	
	ING ME SER(0'		D MUD ROTARY(5'-1	65')	DRILL I	KIG												- 1	OREH '.0 in	OLE DIAMETER	
MC(2	2-1/2"	), SP BACK	) AND SIZE(S) (ID) T(1-3/8"), ST(2-7/8" FILL AND COMPLETIO			mati NDW	ic, 1	40 ER	lbs, 30	G DR	ILLIN	•		ER D				8 TC	35%	R EFFICIENCY, ERI	
Elevation (ft)	Depth (ft)	Material Graphics	ŗ	Description		Sample Location	ample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	-0	2		ose; brown; fine SAND;		_	3-	0	<u> </u>	Z	60	60	39		2		<u>п</u>	<u> </u>	1	COMP, DS, RV Hand augered down to	_ o 5 <u>†</u>
91.00			with reddish brown; m medium plasticity; hig SILTY SAND (SM); m with reddish brown; m	CL); very stiff; brown mottle oist; some SAND; fine SA h dry strength; low toughr edium dense; brown mott oist; fine SAND; stratified SILTY SAND (SM); [NATI	AND; ness/ lled I with		S- 12	5 5 3.5	2-4-6	10	18	12	37							SILTY SAND in shoe PP: 2, 2.5, 4.0 tsf	
86.00	10			(SP); medium dense; gray les; fine to coarse SAND; d; micaceous.		0,0,0,0,0 × °	C- 14	10 10 1.5	16-16-25	41	18	9		106.7	18.0				$\sim$	DS	-
81.00	15		moist; some SAND.` Poorly graded SAND (	L); very stiff; grayish brow SP); dense; grayish brow to coarse SAND; subrou	- — — — /n;		5	13			22	20		97.4	24.0	36	24			U-5 driven 22"  Clay layer at top of U-5 SP at end of U-5	
76.00			SANDY lean CLAY (C some SAND; fine to m plasticity; low dry stree	L); stiff; dark brown; mois nedium SAND; medium ngth; high toughness.	st;														000000000000000000000000000000000000000		
			(continue	ed)				1 :												l	_
								В	EPORT BORING IST.	3 R				ROUT	E	P	OSTM	1ILE		HOLE ID S0072R EA	
<b>/</b>	H	A igh-	LIFORNIA Speed Rail Autho	rity Casawa H	ARLIP 24-SHADE THE	• NATION OF THE PROPERTY OF TH		C	ROJECT Californi RIDGE N	ia H	igh-	Spe	ed PREF		D BY				DA <sup>-</sup>	TE SHEET 27-14 1 of 9	

PROJE <b>Calif</b> LOGG SV	fornia	a High	n-Speed Train Fres BEGIN DATE Oct-01-13	no to Bakersfield  COMPLETION DATE  Oct-07-13					ATION (L / E643									1	<b>13157</b> OLE ID	)	_
DRILLI Greg	gg Dri	illing/E	ACTOR/DRILLER E. Santellan	OCI-07-13	IN-SIT	UΤ	EST			191	5.93	0 (1	NAD	03 (	,A Z	+)		SI	196 ft	CE ELEVATION (NAVD88)	_
AUG SAMPL MC(2	ER(C LER T 2-1/2 HOLE	YPE(S "), SP BACK	D MUD ROTARY(5'-1 ) AND SIZE(S) (ID) T(1-3/8"), ST(2-7/8' FILL AND COMPLETIC	')		IAM oma JND	MEF atic,	140	lbs, 30	G DF	RILLIN	-		ER D				H/ 8 E) T(	7.0 in AMMER 35%	OLE DIAMETER  R EFFICIENCY, ERI  DEPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics	1	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	-20 					M	MC- 06	20	13-12-13		18	18		116.4				UU 2716	MANNO	PP: >5.0 tsf TV: 0.55 tsf	
71.00	25		densé; brown; moist; micaceous.	with SILT (SP-SM); mediu fine to coarse SAND;			SS- 07	25 26.5	9-10-11	21	18	18	13								
66.00	30			gh dry strength; high tough			MC- 08	30	6-9-11	20	18	14		99.8	25.8 17.8		35	UU 1947		PP: 2.0, 2.0, 3.25 tsf TV: 0.55 tsf	
61.00	35			ND; low toughness. edium dense; brown with wn; moist; little fines; fine			SS- 09	35 36.5	8-6-7	13	18	14									
56.00	40		brown seams; moist; plasticity; high dry stre	CL); stiff; brown with reddi few SAND; fine SAND; mength; medium toughness	edium														MANDEREDE		-
			(continu	<del>cu</del> j					REPORT											HOLE ID	_
U/O								E	BORINO DIST.	3 R				ROUT	E	PO	OSTM	1ILE		S0072R EA	
	H	CA ligh-	LIFORNIA Speed Rail Autho	CALEDWA H	ARLIP ar-SIMILA TH	PAPI .			ROJEC Californ RIDGE I	ia H	igh-	Spe	ed REF		D BY				DAT 1-2	TE SHEET 27-14 2 of 9	_

Calif LOGG	<b>fornia</b> ED BY	High	<b>n-Speed Train</b> BEGIN DA	Fresno	to Bakers	<b>field</b> N DATE	BORE	HOL	ΕL	.OCA	ATION (L	at/Lo	ong o	r Nor	th/Ea	ast ar	nd Da	tum)		1;		7-00		
SV			Oct-01-	13	Oct-07-13		N184	199	30.	759	/ E643									S	007	2R	(ATIO::	
			ACTOR/DRILLEF E. Santellan	≺			IN-SITU	J TE	∟ST	ING												E ELEV		
DRILL	ING M	ETHO	D				DRILL	RIG	;											ВО	REHO		METER	
			MUD ROTARY  ) AND SIZE(S) (II		)		D44 SPT H	A B 4B	VAL.	TV	DE										0 in		IENOV E	):
			7T(1-3/8"), ST(								) lbs, 30	)-inc	h dr	ор							iviivi⊑i 5%	KEFFIC	IENCY, EF	XI
BORE	HOLE	BACK	FILL AND COMP				GROU			TER	DURIN			NG						1		DEPTH (	OF BORIN	G
Piezo	omete	er					READII	NG	э —		Not Re	core	ded	T		Not F		rded		16	35 ft			
Elevation (ft)	Depth (ft)	Material Graphics		Desc	cription				Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		Remarks/ other Tests	i
	=								ИС- 10	40	5-8-8	16	18	17		113.3	18.0	30	15			PP: 5.5, TV: 0.63	2.5, 2.0 tsf 3 tsf	
			SANDY SILT (N	 ML); very si	tiff; brown m	ottled with		M		41.5							21.6	30	15	UU 1356	)			
	<b> </b>		reddish brown; plasticity; claye		e to coarse S.	AND; low																		
151.00	45								SS- 11	45	13-11-10	21	18	12.5	-									
								X		46.5					57									
			SANDY SILT (Nof reddish brows	n; medium			aks														000000000000000000000000000000000000000			
146.00	50							Ţ,	ИС- 12	50	11-17-20	37	18	16								Medium MC-12	SAND at to	∄
								X		51.5					50.8						0000	Fine SA MC-12	ND at botto	
			SILTY SAND (S medium SAND	SM); dense ; subround	et to rounde	ist; little fined.	 les;														$\mathfrak{M}$			
444.00	55—																							Ξ
141.00	55								ИС- 13	55	25-28-24	52	18	17										∃
			CLAY with SAN little SAND; fine strength; mediu	SAND; m	edium plasti	orown; moi icity; high o	st; dry	X		56.5											0000000			
																					100000	PP: 3.0, TV: 0.23	5.0, 4.0 tsf 3 tsf	
136.00	60																							
			(co	ntinued)							REPORT											HOLE		$\dashv$
											BORINO DIST.		EC(			ROUT	E	PC	DSTM	/ILE		S00 EA	72R	$\dashv$
-	1	- A	I I E O D N	II A	LIR	SHMMA	RUP				ROJEC													
	H	igh-	LIFORN Speed Rail A	uthority	7	CALFORNIA HO-	- SPARIO TWO			(	Californ BRIDGE	ia H	ligh-	Spe	eed PREF		D BY				DAT	E 7-14	SHEET 3 of	

Calif	ECT NAN <b>fornia F</b> ED BY		Speed Train Fr BEGIN DATE	esno to Bakersfield COMPLETION DATE	E BOR	REHC	DLE	LOCA	ATION (L	.at/Lo	ng o	· Nor	th/Ea	ist an	d Da	tum)		1	ROJEC <b>13157</b> OLE ID		_
			Oct-01-13 CTOR/DRILLER Santellan	Oct-07-13	N1	849	930		/ E643									SI		72R CE ELEVATION (NAVD88)	
DRILLI	ING MET	THOD	IUD ROTARY(5	'-165')	DRIL D4		G											В		OLE DIAMETER	
MC(2	2-1/2"),	SPT	AND SIZE(S) (ID) (1-3/8"), ST(2-7 LL AND COMPLET		Au	tom	atic.		lbs, 30	G DF	RILLIN	-		ER D	Reco			8 E) T(	35%	R EFFICIENCY, ERI	
Elevation (ft)	Depth (ff)	Material Graphics		Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
	60		brown seams; som toughness.	(CL); hard; brown with red ne SAND; high dry strength ; dense; brown; moist; fine	ı; high		SS- 7 14	60	9-17-29			13.5	28				<u> </u>			PP: >5.0, 4.25, >5.01	sf -
31.00	65		Lean CLAY (CL); v	ery stiff; brown with reddis ; high dry strength; mediun			SS-7 15	65 66.5	5-9-10	19	18	12.5			18.7	43	29				
26.00	70		SILTY SAND (SM) medium SAND; mi	; brown; moist; some fines caceous.	; fine to		U- 16	70			24	21	33	104.8	16.9				$\otimes$	DS	
21.00	75		some fines; mediu toughness. SANDY SILT (ML):	AY (CL-ML); hard; brown; r m plasticity; high dry streng ; hard; dark brown variegat AND; fine SAND; low plasti	gth; low ed with		MC- 17	75 76.5	12-21-39	60	18	18	58	113.4	18.6				000000000000000000000000000000000000000	Botton of U-16 SM	
16.00	80		some SAND; medi toughness.	CH); hard; grayish brown; um dry strength; medium	moist;																
			(conti	nued)				F	REPORT	TITL	.E									HOLE ID	
								E	BORINO DIST.	GR				ROUT	E	P	OSTM	1ILE		S0072R EA	
	C. Hig	AL gh-S	IFORNIA peed Rail Aut	hority	HOH-SHIED	TRAPI		(	PROJECT Californ BRIDGE I	ia H	igh-	Spe	ed PREF		D BY				DA1	TE SHEET 27-14 4 of 9	

<b>Calif</b> LOGG	ECT N <b>fornia</b> ED BY	a High	-Speed Train Fres BEGIN DATE	COMPLETION DATE					TION (L									1	1 <b>315</b> OLE 1	
			Oct-01-13 ACTOR/DRILLER Santellan	Oct-07-13	N18 IN-SIT				/ E643	/97	3.93	б (М	NAD	83 C	A Z	4)		SI	JRFA	72R .ce elevation t (NAVD88)
		ETHOD	O MUD ROTARY(5'-1	35')	DRILL D44		G											В	OREH	HOLE DIAMETER
SAMPI MC(2 BOREI	LER T	YPE(S) "), SP BACKI	NOD ROTART (3-1) AND SIZE(S) (ID) T(1-3/8"), ST(2-7/8" FILL AND COMPLETIO	)	SPT F	IAN oma	atic, OWA	140	PE Ibs, 30 DURING Not Re	3 DF	RILLIN			ER D	Reco			H/ 8 T(	35%	ER EFFICIENCY, ERI
Elevation (ft)	Depth (ft)	Material Graphics	[	Description		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests
	80						U- 18	82			24	24		98.6	25.9	53	37	UU 3230	MINIMAN	Brown at top of U-18 (slough) PP: 2.0, 2.5, 4.0 tsf  Grayish brown at bottom- of U-18
11.00	85		- dark brown; fine SAN toughness.	ID; high dry strength; high	1	X	SS- 19	85 86.5	10-20-23	43	18	10.5			18.4	64	48		000000000000000000000000000000000000000	
06.00	90		- very stiff.			X	MC- 20	90 91.5	14-31-43	74	18	16		114.6	17.0			UU 4796	MANDAMANA	PP: 3.25, 3.25, 2.75 tsf TV: 0.88 tsf
01.00	95			rd; grayish brown variega brown; moist; fine to med			SS- 21	95 96.5	12-13-23	36	18	15	58						<u> </u>	
<b>.</b> 96.00 <b>-</b>	100		reddish brown seams;	grayish brown variegated or moist; fine SAND; mediu strength; high toughness	ım														100000000000000000000000000000000000000	
			· · · · · · · · · · · · · · · · · · ·					R	EPORT	TITL	E	700								HOLE ID
									BORINO DIST.		ECC			ROUT	E	P	OSTM	1ILE		S0072R EA
	H	CAI	IFORNIA Speed Rail Autho	rity CALECAPER HG	ARLIP BH-SIMED TO	PAP4		(	ROJECT Californ RIDGE N	ia H	igh-	Spe F	ed	1E Trair PARE orgh	D BY				DA 4	TE SHEET 27-14 5 of 9

		IAME <b>a Higl</b> Y	<b>h-Speed</b> BEG	Train Fres	sno to Bakersfield COMPLETION DATE	BORE	HO	LEL	OCA	TION (L	at/Lo	na oi	Nor	th/Ea	ast an	ıd Da	tum)		1		CT NUMBER <b>77-00</b> D	_
SV			Oc	t-01-13	Oct-07-13	N18	499	930.	759	/ E643									S	300	72R	
			ACTOR/DF E. Santella			IN-SIT	UΤ	EST	ING												CE ELEVATION t (NAVD88)	
		IETHO		TARY(5'-1	165')	DRILL D44		3											ВС	OREH	IOLE DIAMETER	
			S) AND SIZE		100 )	SPT F	IAM												H/		ER EFFICIENCY, ERI	
				, ST(2-7/8						lbs, 30				ΛEΤ	ED N	וום	NG (	DATE		35%	DEPTH OF BORING	
	omet		II ILL AND	OOMI LLTIC	, , , , , , , , , , , , , , , , , , ,	READ				Not Re					Not F		•		1	65 ft		
		S							Ξ							t (%)		(%				
Œ		Graphics					Sample Location	Sample Number	Sample Depth (ft)	6 in.	1/ft)	(in)	(ii)	(%)	Dry Density (pcf)	Content (%)	t (%)	Plasticity Index (%)		Method		
Elevation	Depth (ft)	rial G					ole Lo	ole N	ole De	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	very (	200 Wash (%)	ensit	ture C	Liquid Limit (%)	icity I	J (psf)	ng Metho	<u> </u>	
Elevi	Dept	Material (			Description		Sam	Samp	Samp	Blow	N-Va	Pene	Recovery	200 V	Dry [	Moisture	Liquic	Plast	TXUU	Drilling	Remarks/ Other Tests	
	100	///	! !					MC- 22	100	7-19-34	53	18	17		92.4	30.6			UU	Ø	Sample #1 disturbed PP: 2.5, 2.0, 2.5 tsf TV: 0.88 tsf	Ī
					at CLAY (CH); hard; grayish brown d with reddish brown; some SAND; fine gh dry strength; low toughness.		Λ		101.5							32.4	50	29	1329		17.0.00 (5)	
	=				reddish brown; some SAND; fine															DISTRIBUTE		•
	_	///	SANDY f	at CLAY (Cl	ish brown; some SAND; fine															$\otimes$		
	Ξ		SANĎ; hi	igh dry stren	dish brown; some SAND; fine															MMM		
	<u> </u>				dish brown; some SAND; fine																	
91.00	105		! !				T	U- 23	105			24	24		88.9	33.1	60	43	UU 1829	MANAMANA	CONSOL	
	=		 																			•
	_		  - 				Ш		107											000		
	Ξ				gray; trace fine SAND; low																	
	Ξ		plasticity.	•																		
	=																			M		
36.00	110							MC-	110	6-11-18	29	18	18							M	PP: 4.0, 3.75, 3.75 tsf	
	_						X	24						99	95.5	27.1			UU 4836	3000	TV: 0.88, 0.63 tsf	
							Н		111.5						95.5	27.1			4836	2000		
	Ī		with layer	rs of reddish	ard; grayish brown variega brown; moist; fine SAND;	ted low														) (M)		
	=		plasticity.	•																		
	=																					•
31.00	115							SS-	115	7-21-24	45	18	15								Grayish brown variega	ated
	_							25													with layers of reddish brown at 116' - 116-6" dark gray at 115' - 116	·; :
	=						$\Box$		116.5					65						M	dain gray at 110 - 110	' :
	1115			): hard: da-1	gray; moist; few SAND; fi		-													<u> </u>		
	=		SAND.	. <sub>)</sub> , naru, qark	ı gray, moist, iew SAND; Ti	i i C														MM		
	_																			1000		
76.00	120-																					
				(continu	ed)																1	
									В	EPORT ORIN	G RI	ECC									HOLE ID S0072R	
			LIFO	DETE	D					IST.		UNT			ROUT	E	PC	OSTM	1ILE		EA	
1		LA	LIFO	RNIA	URS HMM	ARUP			C	ROJEC <sup>*</sup> Californ	ia H	igh-	Spe	ed	Trair							
		tigh-	Speed R	ail Autho	CALETONNA HO	ar-SHIID TI	PAPV		В	RIDGE	NUME	BER			PARE orgh						TE SHEET 27-14 6 of 9	

Cali LOGO SV DRILL Gree DRILL AUC SAMF	ING Cogg Dri ING M SER(Co	ONTR Illing/E ETHO '-5'), YPE(S	Oct-01-13 Oct-07-13  ACTOR/DRILLER  E. Santellan  D  MUD ROTARY(5'-165')  S) AND SIZE(S) (ID)  PT(1-3/8"), ST(2-7/8")	DRILL RIG D44 SPT HAM Automa	930 TES <sup>-</sup> G MMEI	.759 TING R TY	PE 0 lbs, 30	7978 -incl	3.93 h dro	6 (N	NAD	83 C	CA Z4	4)		1: HC S SU 1: BC 7: HA 8	3157 DLE ID 007 RFAC 96 ft PREHC .0 in .MMEF 5%	2R E ELEVATION (NAVD88) DLE DIAMETER R EFFICIENCY, ERI	
	:HOLE :omete			READING		TER	Not Re			١G			RILLI Reco	•	DATE	1	TAL E 65 ft	DEPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics	Description	Sample Location	ନ୍ଦ୍ର Sample Number	Sample Depth (ft)	30.35 Blows per 6 in.	S N-Value (bl/ft)	⇔ Penetration (in)	9 Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
SK F-B MASTEK DATABASE.GEB 172/174 99 00 00	125		CLAYEY SAND (SC); dense; dark gray; moist; so CLAY; fine SAND.  SANDY lean CLAY (CL); hard; dark greenish gray moist; some SAND; fine SAND; medium plasticit high dry strength; medium toughness.  CLAYEY SAND (SC); dense; dark greenish gray; moist; little CLAY; fine SAND; micaceous.  SILTY SAND (SM); very dense; grayish brwon; m some SILT; little CLAY; fine SAND; micaceous.	ome	\$SS-27	121.5 125 126.5	6-18-28	46		14.5	92						<u> </u>		74 - RFP 10 : HSK13-57
IEK LIBKAKY.GPJ CH	135		SILT (ML); hard; olive gray; moist; trace SAND; fi SAND.  SANDY SILTY CLAY (CL-ML); very stiff; dark greenish gray; moist; some SILT; some SAND; fi SAND; low plasticity; high dry strength; low toughness; micaceous.		SS-29	131	17-30-18	48	18	6	98						000000000000000000000000000000000000000		7-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
SE .			(continued)			L												1,1015.5	_
1.0.3A BOREHOLE LOG	) (	CA ligh-	LIFORNIA Speed Rail Authority	RUP -SHIED THAN		E C	REPORT BORING DIST. PROJECT Californ BRIDGE N	CO CO OR ia H	BRII	Y DGE Spe	NAMeed PREF		າ D BY	PC	OSTM	IILE	DAT 1-2	HOLE ID S0072R EA SHEET 7-14 7 of 9	

41.00 155 O 155 W (#) 41.00	Description  - hard; grayish brown; medium plastidry strength.	ticity; very high	Sample Location	Sample Number	(t) 141.5 141.5 146.5	11-14-15		B Penetration (in)	DI Recovery (in)	200 Wash (%)	Dry Density (pcf)		Liquid Limit (%) Plasticity Index (%)	(Jsd) nnx1	30000000000000000000000000000000000000	PP: >5. tsf TV: 0.2	Remarks/ Other Tests .0, >5.0, >5.0, 3 tsf
51.00 145		ticity; very high		SS-	145	11-14-15	33	18	10		92.1 :	29.4		UU 1065			3 tsf
.36.00-160	- dark yellowish brown; high plasticit toughness; occasional cemented no diameter).	ty; high odules (1/4"		MC- 32	150	19-31-33	64	18	13						000000000000000000000000000000000000	TV: 1.2	.0, >5.0, >5.0 5 tsf ill for PS logg -165'
	(continued)																
€ C	IFORNIA peed Rail Authority	URS HMM ARUP			E F	REPORT BORIN DIST. PROJEC Californ BRIDGE	G RI CO T OR ia H	BRIE	Y DGE I Spe	NAMI ed 1			POST	MILE	DA	EA	E ID 072R

PROJECT N.		Casad Tusi	F	4a Dalcam	afialal														- 1		T NUME	SER	
LOGGED BY	Hign-	<b>Speed Trai</b> l BEGIN D	<b>n Fresno</b> ATE (	<b>TO BAKERS</b> COMPLETION	STIEIO ON DATE	BOREI	HOL	E L	OCA	TION (L	at/Lo	ng or	Nort	th/Ea	st an	d Dat	um)		HC	<b>3157</b> DLE ID	7-00		
SV		Oct-01	-13	Oct-07-13		N184	499	30.	759	/ E643	7978	3.93	6 (N	NAD	83 C	:A Z4	1)			007			
		CTOR/DRILLE	R			IN-SIT	U TI	EST	ING										- 1		E ELEV		
Gregg Dril		Santellan				DDILL	DIO												_		(NAVE		
		UD ROTAR	Y(5'-165'	)		DRILL D44	RIG	j												.0 in	JLE DIA	METER	
-	-	AND SIZE(S) (		,		SPT H.	АМ	MFR	TYF	oF.									_		R FFFIC	IENCY, EF	?i
		(1-3/8"), ST								lbs, 30	)-incl	n dro	ор						- 1	5%		,	
		LL AND COM							ER	DURIN	G DR	ILLIN	IG .	AFT	ER D	RILLI	NG (I	DATE	) TC	TAL [	DEPTH	OF BORIN	G
Piezomete	r					READI	NGS	s ·		Not Re	cord	led		١	lot F	Recor	ded		1	65 ft			
Elevation (ft)	Material Graphics		Des	cription			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	00000000000000000000000000000000000000	C	Remarks/ other Tests	
31.00 165		Borehole term 10/7/2013. See Borehole and key to test	Log Legen	d for soil cla	assification	chart														0000			
21.00 175																							
-16.00-180									В	EPORT BORING	G RE				ROUT	E	PC	DSTM	ILE		HOLL SOO EA	E ID 072R	
		IFORN peed Rail		7 =	CALIFORNIA MO	RUP	AFV		P	ROJEC Californ	Г OR ia H	BRII igh-	OGE Spe	NAM ed PREP	IE Trair PAREI	n D BY				DAT		SHEET	
													J	J. Bo	orgh	esi				1-2	7-14	9 of	9

	ECT N Fornia ED BY		h-Speed Train Fres BEGIN DATE Oct-15-13	no to Bakersfi COMPLETION Oct-15-13					TION (I									<b>1</b>	<b>315</b> DLE I	CT NUMBER <b>77-00</b> D <b>73R</b>	
Greg	gg Dri	illing/E	ACTOR/DRILLER E. Santellan					TING				•						SL 2	JRFA 13 f	CE ELEVATION t (NAVD88)	
DRILL AUG			<sup>D</sup> MUD ROTARY(5'-8	1.5')		ILL R -10 (		1)											)REH -7/8	HOLE DIAMETER	
SAMP	LER T	YPE(S	S) AND SIZE(S) (ID)		SP	ΓHAI	име	R TY										H/	AMME	ER EFFICIENCY, ERI	i
			PT(1-3/8"), ST(2-7/8" FILL AND COMPLETIO		I				lbs, 3			-	ΛET	ED D	ו וום	INIC (	DATE	1 -	55%	DEPTH OF BORING	_
	cem			14		ADIN		VI LIV	Not R			10			Reco				1.5 f		,
					•										(%)		(9)				
Elevation (ft)	Depth (ft)	Material Graphics		Description		Sample Location		Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method	Remarks/ Other Tests	
			SANDY SILTY CLAY (yellowish brown; mois to medium plasticity; v toughness.	t; some SAND; fir	ne SAND; low	50	B- 01	0			60	60							2222222	CBR, COMP, CORR Bulk/hand augured to	
208.00			SANDY SILT (ML); sti some SAND; fine SAN to medium toughness	ID; very high dry s			MC- 02	6.5	4-5-8	13	18	14		92.9	28.4	38.6	2.4			PP: 1.5, 1.5, 1.75 tsf TV: 0.15 tsf	
203.00	10		- medium stiff; low tou	ghness; micaceo	us.	X	SS- 03	10	2-3-2	5	18	18			25.9	31.1	6.6		MINIMARIAN	PP: 0.5, 0.5 tsf	•
			- stiff.  SILTY SAND (SM); me gray; moist; some SIL	edium dense; darl T; fine SAND; mid	k greenish caceous.		U- 04	12		250ps to 300ps		24		105.9	21.6			UU 1880		CONSOL	
198.00	15		- grayish brown.				MC-	15	5-8-9	17	18	18							MM	Recovery not recorde	:d
	=		SANDY lean CLAY (C variegated with reddis fine SAND; medium p low toughness.	h brown; moist; so	ome SAND;	<b>)</b>	05	16.5						103.3	20.4	33	10			PP: 2.5, 4.0 tsf TV: 0.20 tsf	
193.00	20		CLAYEY SAND (SC); moist; some CLAY; fir SANDY CLAY (CL); st brown; some SAND; fi high dry strength; high	ne-medium SAND tiff; brown mottled ine SAND; high pl	with layers of	f															
			(continue	ed)																	
								E	EPORT BORIN DIST.	ĢR				ROUT	E	P	OSTM	1ILE		HOLE ID S0073R EA	
	9	CA	LIFORNIA Speed Rail Autho	LIRS	HMM ARLIP			P	ROJEC	T OR	BRII	DGE Spe	NAM eed	1E Traii	n						
		iigh-	opeea Kali Autho	rity \do	LEDINI HOH-SHI	Le Trans		B	RIDGE	NUM	BER			PARE orgh	D BY I <b>esi</b>					TE SHEET 27-14 1 of 5	,

LOGG	ornia ED BY	Hig		OMPLETION DATE					TION (L									<b>1</b> ;	<b>3157</b> LE ID		
			RACTOR/DRILLER	Oct-15-13	N184 IN-SITI				/ E644	036	1.67	1) 8	NAD	83 C	CA Z	1)			007 RFAC	3R E ELEVATION	
Greg DRILL	_		E. Santellan		DRILL	RIG												_		(NAVD88) DLE DIAMETER	
AUG	ER(0	'-5'),	MUD ROTARY(5'-81.5')	)	M-10			)											-7/8 i		
			S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8")		SPT H.				PE Ibs, 30	)-inc	h dr	go							MMEF 5%	R EFFICIENCY, ER	
BORE	HOLE	BACK	FILL AND COMPLETION		GROU	IND\	WA.	TER	DURIN	G DF	ILLIN	•	AFT	ER D	RILLI	NG (	DATE	E) TO	TAL [	DEPTH OF BORING	3
Neat	ceme	ent gr	rout		READI	NGS	5	Т	Not Re	cord	led		1	Not F	Reco	ded		8	1.5 ft		-
Elevation (ft)	Ö Depth (ft)	Material Graphics	Desc	ription			Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth	Remarks/ Other Tests	
				z			SS- 06	20	3-6-7	13	18	18									
188.00	25		SANDY SILT (ML); very stivariegated with reddish brufine SAND; no plasticity; wtoughness; micaceous.	own; moist; some SAN	ID;	X	07	25 26.5	9-10-8	18	18	15		110.6	19.4		NP	UU 3262		PP: >5.0, 3.5, 2.5 tsf TV: 1.88 tsf	9 No.: HSR13-57
183.00	30		- dark yellowish brown.				SS- 08	30 31.5	3-3-4	7	18	18			18.2	27.4	2.2			PP: 3.0, 2.0 tsf	102/2014 - REP
178.00	35		- dark yellowish brown var low to no plasticity; not mid		own;	V	ИС- 09	35	6-12-23	35	18	16.5							${\it Modelloop}$	PP: 2.5, 3.0, 2.5 tsf TV: 0.20 tsf	
			SILTY SAND (SM); mediul brown; moist; little fines; fi		sh			36.5													
-172 00	10-		SANDY SILT (ML); very sti reddish brown; moist; som SAND; very high dry streng with layers of poorly grade (SP-SM); cemented nodule	ne SAND; fine to mediu gth; medium toughness d SAND with SILT	ım																
-173.00┕	40		(continued)																		
									EPORT ORIN			)RD	)							HOLE ID S0073R	$\neg$
									IST.		UNT			ROUT	Έ	PC	STM	1ILE		EA EA	$\dashv$
	H	CA ligh-	LIFORNIA Speed Rail Authority	CALSTONNER HIGH	-SIMILE TIME	NAPY.		C	ROJEC Californ RIDGE I	ia H	igh-	Spe	ed PREF	Trair	D BY				DAT 1-2	E SHEET 2 of 5	

Cali LOGG	fornia ED BY	Higl	<b>h-Speed Train Fres</b> n BEGIN DATE Oct-15-13	to to Bakersfield  COMPLETION DATE  Oct-15-13					TION (L / <b>E64</b> 4									<b>1</b> ;			
DRILL			ACTOR/DRILLER E. Santellan	300 10 10	IN-SIT				, <u>L</u> O-1-1	300		· (1	*/ \L	30 0	,, , <u>, , , , , , , , , , , , , , , , ,</u>	•,		SU	RFAC	CE ELEVATION (NAVD88)	
DRILL	ING MI SER(0	THO' '-5'),	DD MUD ROTARY(5'-81	.5')	DRILL M-10	0 ([	D44	<u> </u>	<b>7</b>									BO 4-	REH0 -7/8 i	OLE DIAMETER n	
MC(	2-1/2'	), SF	S) AND SIZE(S) (ID) PT(1-3/8"), ST(2-7/8")			oma	atic,	140	lbs, 30			•			<b></b>			8	5%	R EFFICIENCY, ERI	
	t ceme		FILL AND COMPLETION rout	l	READ			ILEK	DURIN Not Re			NG		Not F	Reco			1	1.5 ft	DEPTH OF BORING	
Elevation (ft)	Depth (ft)	Material Graphics	D	escription		Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		
	, <b>,,</b>		CU T (A4) >			X	SS- 10	41.5	7-7-7	14	18	14.5			16.6	34.7	4.2			PP: 3.0, >5.0 tsf	
168.00	45			f; dark yellowish brown; n D; medium plasticity; very ness; weakly cemented		7	MC- 11	45	5-6-7	13	18									Reacts with HCL PP: 2.5, 2.25, 2.25 ts	13-57
E.GLB 1/2//14		•				X	11	46.5					81.4	101.5	25.6			UU 1109		TV: 0.45 tsf	No.: HSR
MASTER DATABAS 00.00	50		SILTY SAND (SM); me fine SAND; micaceous	dium dense; brown; mois	it;	<u> </u>	SS- 12	50	5-7-8	15	18	15							000000000000000000000000000000000000000		2014 - RFP
1.0.3.4 BOXEHOLE LOG - CHOI PER KEV AKUP DOI K LIBKAKY, MASI EK LIBKAKY, GFJ CHSK F-B_MASI EK DA I ABASE.GLB 1/2/14  1.0.3.4 BOXEHOLE LOG - CHOI PER KEV AKUP DOI K LIBKAKY, GFJ CHSK F-B_MASI EK DA I ABASE.GLB 1/2/14  1.0.3.4 BOXEHOLE LOG - CHOI PER KEV AKUP DOI K LIBKAKY, GFJ CHSK F-B_MASI EK DA I ABASE.GLB 1/2/14	55			with reddish brown and l nodules up to 1" diamete		X	MC- 13	51.5 55 56.5	10-12-18	30	18		42.3		18.9				000000000000000000000000000000000000000	Reacts with HCL	04/02/2014
153.00	60		brown; moist; little CLA	very dense; brown to redd Y; fine to medim SAND.	ish														0000000000000000		
E			(continue	d)					EPORT											HOLE ID	$\dashv$
JLE LO								Е	BORING IST.	G R				ROUT	E	PC	DSTM	IILE		S0073R EA	_
T.U.SA BOREH	H	CA igh-	LIFORNIA Speed Rail Author	URS   HMM   A	RUP	TAPE		C	ROJEC Californ RIDGE I	ia H	igh-	Spe F	ed PREF		D BY				DAT 1-2	TE SHEET 27-14 3 of 5	

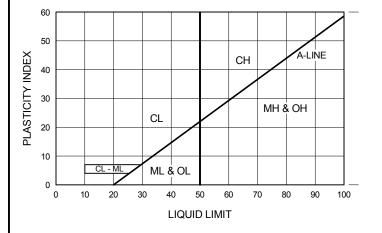
Calif LOGGI SV	<b>ornia</b> ED BY	/	n-Speed Tra BEGIN I Oct-1	DATE 5-13	<b>no to Bak</b> COMPLE Oct-15	TION DATE					TION (L / E644									H(	3157 DLE ID 3007	'3R		
Greg DRILLI	g Dri NG M	lling/E ETHOI					IN-SIT			ΓING										2	13 ft	(NAV	VATIO D88) IAMETE	
SAMPL MC(2 BORE	ER T 2-1/2' HOLE	YPE(S	MUD ROTAI ) AND SIZE(S) T(1-3/8"), S <sup>-</sup> FILL AND COM out	(ID) T(2-7/8"	')			HAM oma	IMEF atic,	R TYI 140 TER	PE Ibs, 30 DURIN Not Re	G DF	RILLIN	-		ER D	Reco			H/ 8	35%	R EFFI	CIENC	
Elevation (ft)	Depth (ft)	Material Graphics		[	Description			Sample Location	Sample Number	Sample Depth (ft)	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	Recovery (in)	200 Wash (%)	Dry Density (pcf)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	TXUU (psf)	Drilling Method Casing Depth		Rema	
48.00	65			H); hard;	brown varie	gated with bla gh plasticity;			SS- 14	61.5	10-20-33	53		14						•		Color gray/y	change ellowish	
	70		Elastic SILT little SAND; f toughness.	 with SAN ine SANI	D (MH); har D; very high	d; brown; moi dry strength; h	ist; nigh	X	15	66.5					91		25.3 22.3	67	45	UU 4642		TV: 1.		
			SILTY CLAY low to mediu toughness; c	m plastic	ity; very high	sh brown; moi n dry strength; /8".	ist; high		SS- 16	70	10-14-18	32	18	11.5			21.1	61.1	13.9		$\sim$	PP: >!	5.0, >5.0	), >5.0 tsf
	75							X	MC- 17	75 76.5	17-22-25	47	18	18							000000000000000000000000000000000000000	PP: >{		), >5.0 tsf
33.00	-80	111K//	(	continue	ed)																			
	)(	CAI	LIFORI Speed Rail	VIA	. 4	URS HMM /	ARLIP			D P	EPORT SORING IST. ROJEC <sup>*</sup> Californ	G RI CC	ECC OUNT	Y	NAM			P	OSTM	IILE			LE ID 1073R	\

ROJE			. 0	T	-: <b>-</b>		_ 4 _ /	D-1-	c:																		NINREK		
_OGGE	<b>ornia</b> ED BY	Higr	n-Spec	<u>:a ira</u> BEGIN	<b>ain F</b> Date	resn E	O TO I	MPLE.	<del>erstic</del> Tion	<b>eia</b> Date	BORE	HO	LE I	OCA	ATION (L	at/Lo	ng or	Nor	th/Ea	ıst an	id Da	tum)		<b>1</b>	315 OLE I	<b>77-00</b> D			
SV				Oct-1				t-15-							/ E644											73R			
			ACTOR		LER						IN-SI	TU T	TES <sup>-</sup>	ΓING										- 1			EVATI		
	_		E. Sant	ellan																				_			VD88)		
DRILLII					D) (()	<b>5</b> 1.04	-1\				DRILL																DIAMET	ΓER	
	•		MUD I		•		.5')				M-1			-										-	1-7/8				
			) AND (								SPT I				PE ) lbs, 30	)_incl	h dra	nn -						- 1	4MM 35%	ER EFF	-ICIEN	CY, ER	I
			T(1-3/ FILL AN												DURIN			-	AFT	FR D	RILLI	NG (	DATE			DEPT	HOFI	BORING	<del>-</del>
Neat				ID 00							READ				Not Re			••			Reco			1	31.5			3011111	_
		g										_		t)							Moisture Content (%)		(%)						
<u> </u>		Material Graphics										Location	Sample Number	Sample Depth (ft)	. <u>c</u>	 ₽	(in)	٦	(%	Density (pcf)	nter	Liquid Limit (%)	Plasticity Index (%)		poc.	E			
Elevation (ft)	£	G										20	Ž	Dep	Blows per 6 in.	N-Value (bl/ft)	Penetration (in)	y (in)	200 Wash (%)	sity	ပိ	mit	y N	osf)	Drilling Method	Casing Depth			
/atic	Depth (ft)	eria										Sample	ble	ble	d Sv	alne	etra	Recovery	Wa	Den	sture	id L	ticit	TXUU (psf)	ing	<u> </u>			
Ele	Dep	Mate				De	escript	tion				Sarr	Sam	Sam	<u>8</u>	>	)en	Zec.	200	Dry I	Mois	-iq	Jas	NX.	i i	Se		narks/ Tests	
	80		- low	to no p	lastic				gth; lo	w toug	hness;		SS-	80	16-29-25		18	12		_	_	_		<u> </u>	Ē		cts with		_
	=		ceme	nted m	ıateria	al.						Й	18												M				
	3			—	—		—	—	—			VΝ		81.5											$\boxtimes$				_
	85			ole ter /2013.		ted at	a dep	h of 8	31.5' o	n																			
	∄		10/10	2010.																									
	∃		See E	oreho	le Log	g Lege	end for	r soil (	classi	ficatior	n chart																		
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		N. AVI		70	K III	A				1000	4 800 100																		
1			LIFC					7	LIRS	HMM	ARLIP			F	ROJEC <sup>*</sup> Californ	ΓOR ia ⊔	BRID	OGE Spo	NAN	IE Trair	· _						-		
	H	gh-	Speed	Rai	Au	thor	ity	7	TEM.	EXPERT H	IQH - SHATE T	TPAPY			RIDGE I						D BY				DA	ATE	SI	HEET	
														-			•		J. Bo	orgh	esi				1-	 27-14	4   5	of 5	5

## **INDEXED SOIL CLASSIFICATIONS**

SYMBOL	DESCRIPTION		MAJOR DIV	ISIONS	•	
GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	CLEAN GRAVELS	: OF N IS D.4	4Y BE IZE		
GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	(LITTLE OR NO FINES)	GRAVELS E THAN HALF SSE FRACTIO GER THAN N SIEVE SIZE	SIZE M	S ZE	
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	GRAVELS WITH FINES	GRAVELS MORE THAN HALF OF COARSE THAN HALF OF LARGER THAN NO.4 SIEVE SIZE	FOR VISUAL CLASSIFICATION, THE 1/4" SIZE MAY BE USED AS EQUIVALENT TO THE NO.4 SIEVE SIZE	COARSE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO.200 SIEVE SIZE	
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	( APPRECIABLE AMOUNT OF FINES )	MOF COA	10N, T	AINEC - OF MA D.200 S	뿔
SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	CLEAN SANDS	: OF N IS IO.4	SIFICAT	E-GR IN HALF	SIEVE IS ABOUT
SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	( LITTLE OR NO FINES )	SANDS THAN HALF OF SE FRACTION IS LER THAN NO.4 IEVE SIZE	. CLAS! EQUIV	OARS RE THA	VE IS A
SM	SILTY SANDS, SAND-SILT MIXTURES	SANDS WITH FINES	SANDS MORE THAN HALF COARSE FRACTIC SMALLER THAN N SIEVE SIZE	VISUAL SED AS	O O S	RD SIE
sc	CLAYEY SANDS, SAND-CLAY MIXTURES	( APPRECIABLE AMOUNT OF FINES )	MOI COA SM,	FOR		THE NO.200 U.S. STANDARD SIEV
ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY				L IS	0 U.S. S
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS		& CLAYS LESS THAN 50		FINE-GRAINED SOILS MORE THAN HALF OF MATERIAL IS SWALLER THAN NO.200 SIEVE SIZE	NO.20
OL	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY				NED S - OF M/ 10.200 §	E
МН	ORGANIC SILTS AND ORGANIC SILT-CLAYS OF HIGH PLASTICITY				FINE-GRAINED RE THAN HALF OF N LLER THAN NO.200	
СН	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS		& CLAYS REATER THAN 5	60	FINE.	
ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS				SM,	
PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	Н	GHLY ORGAN	NIC SOI	LS	
os	OILY SEDIMENTS					

#### **PLASTICITY CHART**



### **KEY TO TEST DATA**

COLL = COLLAPSE POTENTIAL PP = POCKET PENETROMETER

CONSOL = CONSOLIDATION RV = R-VALUE

CORR = CORROSIVITY SIEVE = SIEVE ANALYSIS

DS = DIRECT SHEAR TV = POCKET TORVANE

EI = EXPANSION INDEX TXCD = CONSOLIDATED DRAINED

ORG = ORGANIC CONTENT

#### **KEY TO SAMPLER TYPE**

BULK

MC = MODIFIED CALIFORNIA SAMPLER

PS = PITCHER SAMPLER

SPT = STANDARD PENETRATION TEST SAMPLER

ST = SHELBY TUBE SAMPLER

NO RECOVERY





SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

# **Appendix C Cone Penetration Test Records**

For CPT Data, see CD

 Table C-1

 Summary of Cone Penetrometer Testing Locations, Depths, and In Situ Testing

Cone		Easting	Elevation	Hand-Auger /	Total Depth	In Situ	Testing
Penetration Test ID	Northing NAD 83 (ft)	NAD 83 (ft)	NAVD88 (ft)	Pre-Drill Depths (ft)	of Drilling (ft)	SCPT <sup>[1]</sup>	PPDT <sup>[2]</sup>
S0044CPT	6,341,778	2,122,861	289.7	0 to 5	100.1		✓
S0045ACPT	6,341,421	2,120,178	287.9	0 to 5 / 20 to 25	100.2		✓
S0045CPT	6,340,277	2,121,584	290.2	0 to 5	71.4		
S0046CPT	6,341,291	2,118,888	288.9	0 to 5 / 20 to 25	100.1		✓
S0047CPT	6,341,290	2,117,582	289.5	0 to 5	100.1		✓
S0048CPT	6,341,794	2,117,554	289.6	0 to 5	100.1		✓
S0049CPT	6,340,231	2,116,588	286.3	0 to 5	100.2		✓
S0050CPT	6,341,333	2,114,953	285.9	0 to 6	100.1		✓
S0051CPT	6,341,797	2,114,935	286.2	0 to 5	100.2		✓
S0052CPT	6,340,158	2,113,547	283.6	0 to 5	100.1		✓
S0053CPT	6,341,437	2,112,281	284.4	0 to 6	100.2	✓	✓
S0054CPT	6,341,279	2,109,665	283.1	0 to 5	100.2		✓
S0055CPT	6,341,753	2,109,666	283.4	0 to 6	100.4		✓
S0056CPT	6,340,154	2,108,369	279.0	0 to 5	100.2		✓
S0059CPT	6,340,121	2,104,153	276.8	0 to 5	100.2		✓
S0060CPT	6,341,930	2,104,318	278.4	0 to 5	100.2		✓
S0062CPT	6,341,340	2,101,814	276.4	0 to 5	100.2		✓
S0063CPT	6,341,732	2,101,713	276.7	0 to 5	100.6		✓
S0065CPT	6,341,984	2,099,077	276.6	0 to 5	100.6		✓
S0068CPT	6,343,992	2,093,802	277.0	0 to 5	99.7		✓
S0071CPT	6,343,464	2,091,194	275.0	0 to 5	90.2		✓
S0074CPT	6,342,620	2,088,539	270.9	0 to 5	84.3		✓
S0075CPT	6,344,348	2,088,483	275.4	0 to 5	106.3		✓
S0076CPT	6,345,224	2,087,225	272.7	0 to 5	90.1		✓
S0078CPT	6,345,178	2,083,335	274.2	0 to 5	110.2		✓
S0079CPT	6,345,762	2,083,225	274.9	0 to 5	108.6		✓
S0080CPT	6,345,162	2,080,966	269.2	0 to 5	80.1		✓
S0082CPT	6,347,502	2,077,885	264.8	0 to 5	90.6		✓
S0084CPT	6,347,849	2,075,039	261.3	0 to 5	99.3		✓
S0086CPT	6,349,328	2,072,575	261.9	0 to 5	118.0		✓
S0087CPT	6,349,621	2,071,798	260.8	0 to 5	150.3		✓
S0088CPT	6,350,087	2,070,517	260.0	0 to 5	150.8	✓	✓
S0089CPT	6,350,372	2,068,581	258.1	0 to 5	150.3		✓
S0090CPT	6,355,631	2,063,357	260.8	0 to 5	105.3		✓
S0094ACPT	6,356,868	2,061,952	260.7	0 to 5	31.2		✓
S0096ACPT	6,358,806	2,059,580	259.9	0 to 5	100.4		
S0098BCPT	6,364,274	2,057,751	260.4	0 to 5	80.7		✓
S0098CPT	6,364,994	2,056,438	260.4	0 to 5 / 28 to 33	97.1		✓



 Table C-1

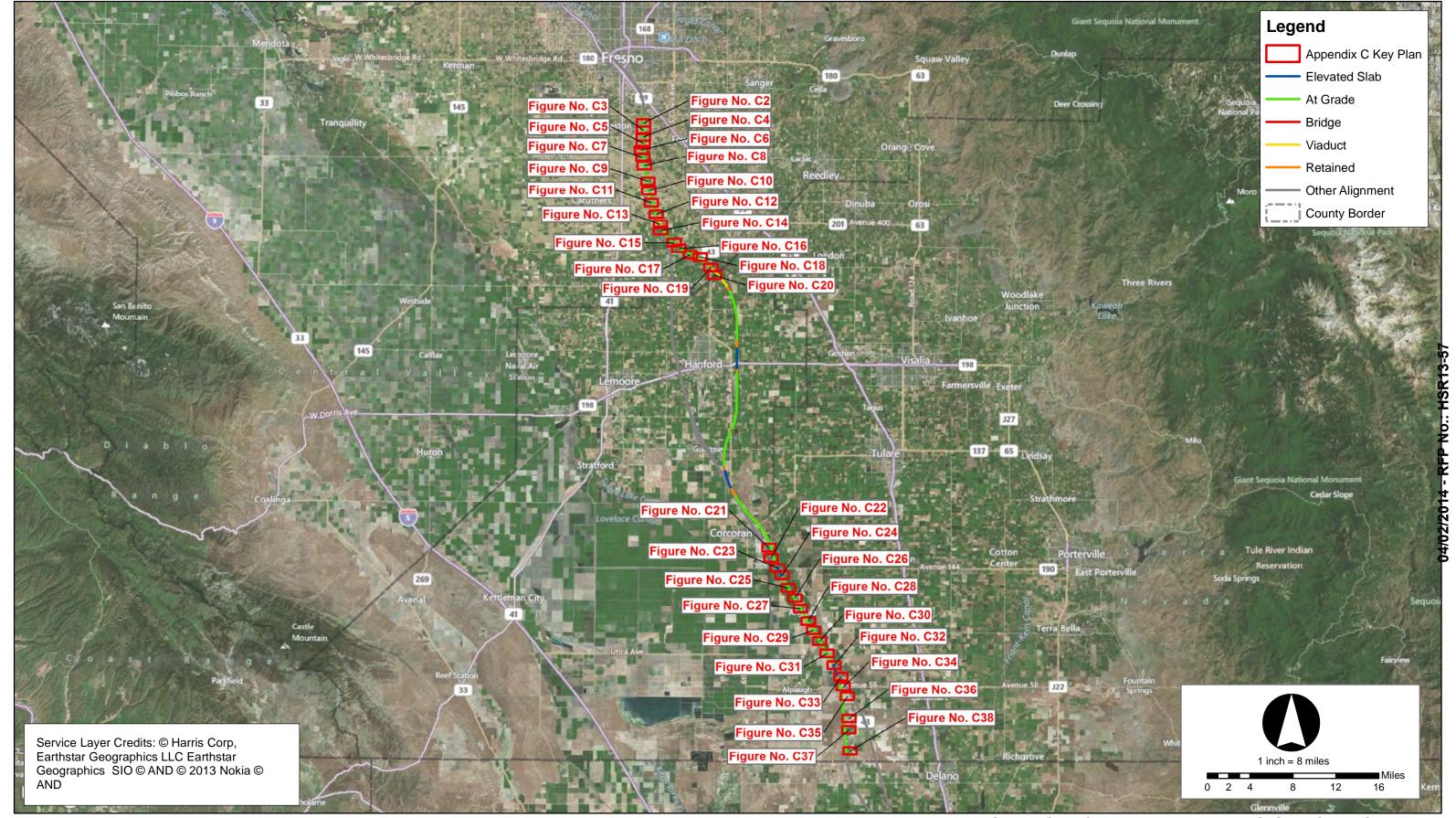
 Summary of Cone Penetrometer Testing Locations, Depths, and In Situ Testing

Cone Penetration	Northing	Easting NAD 83	Elevation NAVD88	Hand-Auger / Pre-Drill Depths	Total Depth of Drilling	In Situ	Testing
Test ID	NAD 83 (ft)	(ft)	(ft)	(ft)	(ft)	SCPT <sup>[1]</sup>	PPDT <sup>[2]</sup>
S0099CPT	6,369,577	2,056,412	263.5	0 to 5	89.1		✓
S0100CPT	6,374,552	2,051,311	269.7	0 to 5	100.9		✓
S0102CPT	6,374,591	2,048,949	270.6	0 to 5	115.0	✓	✓
S0105BCPT	6,374,588	2,046,786	267.7	0 to 5	143.5		✓
S0186CPT	6,403,204	1,912,295	192.7	0 to 5	130.3		✓
S0188CPT	6,404,309	1,907,316	193.6	0 to 5	97.0		✓
S0190CPT	6,406,413	1,903,711	194.0	0 to 5	150.4		✓
S0191CPT	6,407,616	1,902,005	194.4	0 to 10	150.3		✓
S0192CPT	6,408,225	1,900,749	194.4	0 to 6	157.3		✓
S0193CPT	6,409,049	1,899,391	196.9	0 to 6	100.4		✓
S0194CPT	6,409,445	1,898,769	198.3	0 to 6	116.6	✓	
S0195CPT	6,412,138	1,894,117	194.2	0 to 5	100.1		✓
S0198CPT	6,413,928	1,891,016	191.7	0 to 5	90.6		✓
S0199CPT	6,415,264	1,888,740	191.7	0 to 5	90.2		✓
S0200CPT	6,415,991	1,887,492	191.9	0 to 5	110.4		✓
S0201CPT	6,416,656	1,886,247	195.1	0 to 5	100.2		✓
S0202CPT	6,418,080	1,883,925	190.3	0 to 5	100.2		✓
S0203CPT	6,417,944	1,880,872	187.7	0 to 6	100.2		✓
S0204CPT	6,420,420	1,880,831	189.3	0 to 5	102.7		✓
S0206CPT	6,422,594	1,876,249	186.2	0 to 6	85.1		✓
S0208CPT	6,425,251	1,871,626	189.3	0 to 6	103.2		✓
S0210CPT	6,427,598	1,867,721	194.7	0 to 6	112.7		✓
S0211CPT	6,429,138	1,865,107	194.4	0 to 6	123.5		✓
S0212CPT	6,427,962	1,864,918	192.2	0 to 5	144.5		✓
S0214CPT	6,431,891	1,860,288	194.0	0 to 5	143.4		✓
S0216CPT	6,434,743	1,855,451	193.1	0 to 5	133.5	✓	
S0218CPT	6,436,022	1,853,397	193.1	0 to 6	100.2		✓
S0220CPT	6,437,984	1,849,936	196.0	0 to 5	120.2		✓
S0221CPT	6,438,630	1,848,810	197.0	0 to 5	116.3		✓
S0222CPT	6,439,406	1,847,496	213.0	0 to 6	93.8		✓
S0225CPT	6,440,870	1,843,835	208.0	0 to 5	117.3		✓
S0226CPT	6,439,137	1,843,824	194.3	0 to 5	123.7	✓	
S0230CPT	6,444,704	1,838,601	213.0	0 to 5	102.9		✓
S0237CPT	6,445,188	1,827,909	211.0	0 to 5	100.4		
S0239CPT	6,445,218	1,822,784	218.0	0 to 5	100.1		✓
S0241CPT	6,445,115	1,812,308	227.0	0 to 5	100.2		✓

 $<sup>^{[1]}</sup>$  SCPT = seismic cone penetration test

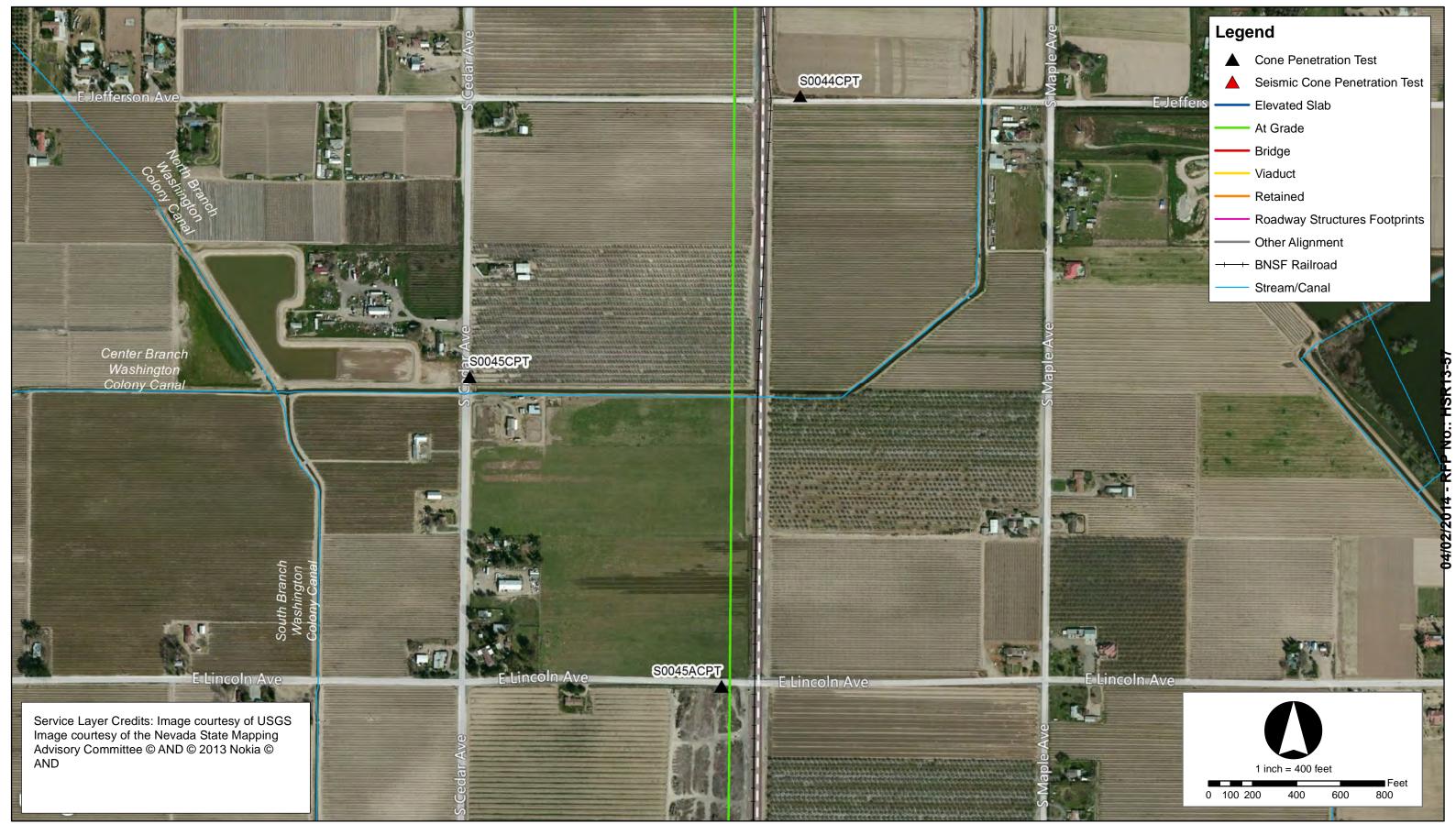
<sup>&</sup>lt;sup>[2]</sup> PPDT = pore pressure dissipation test





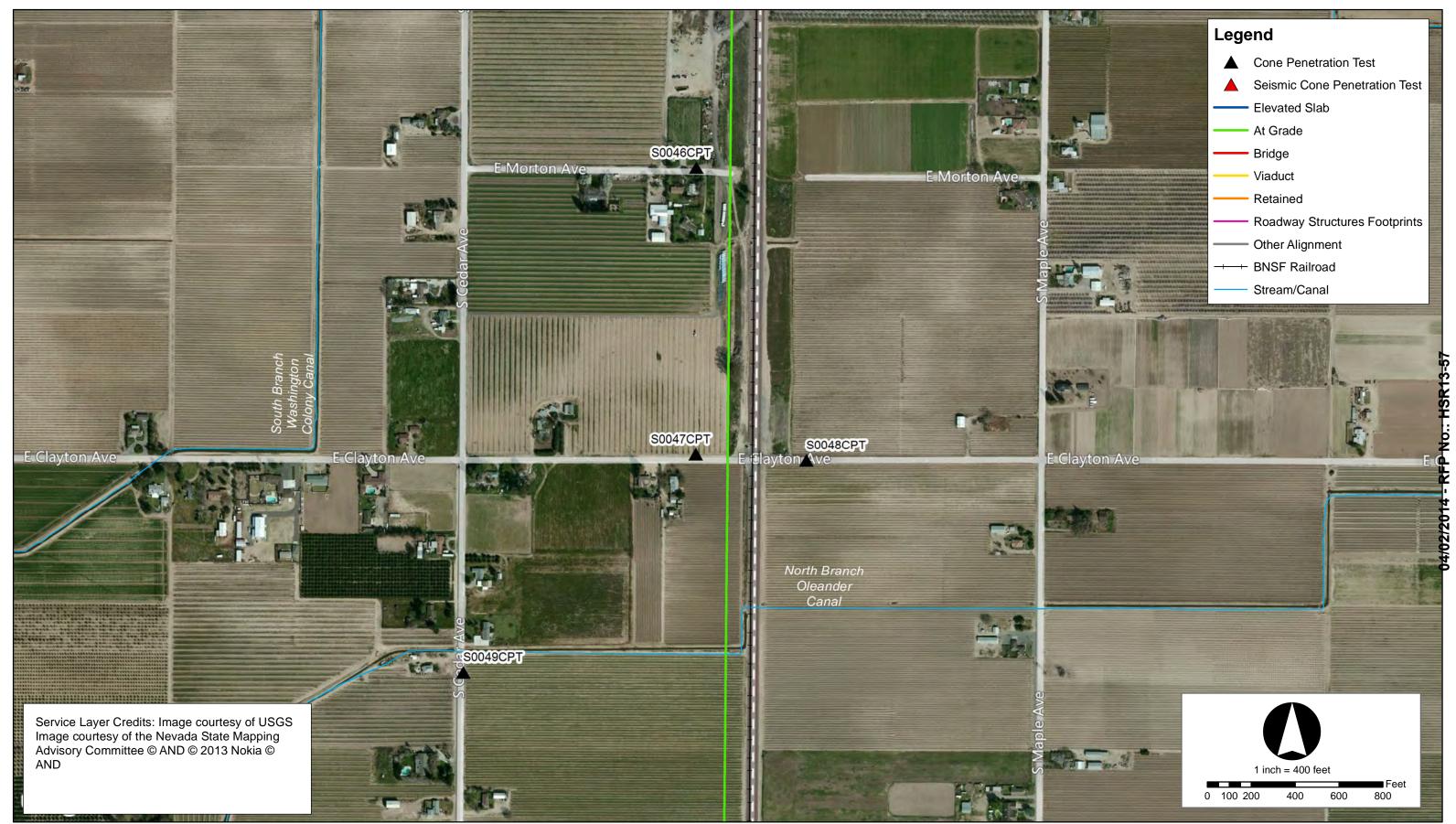






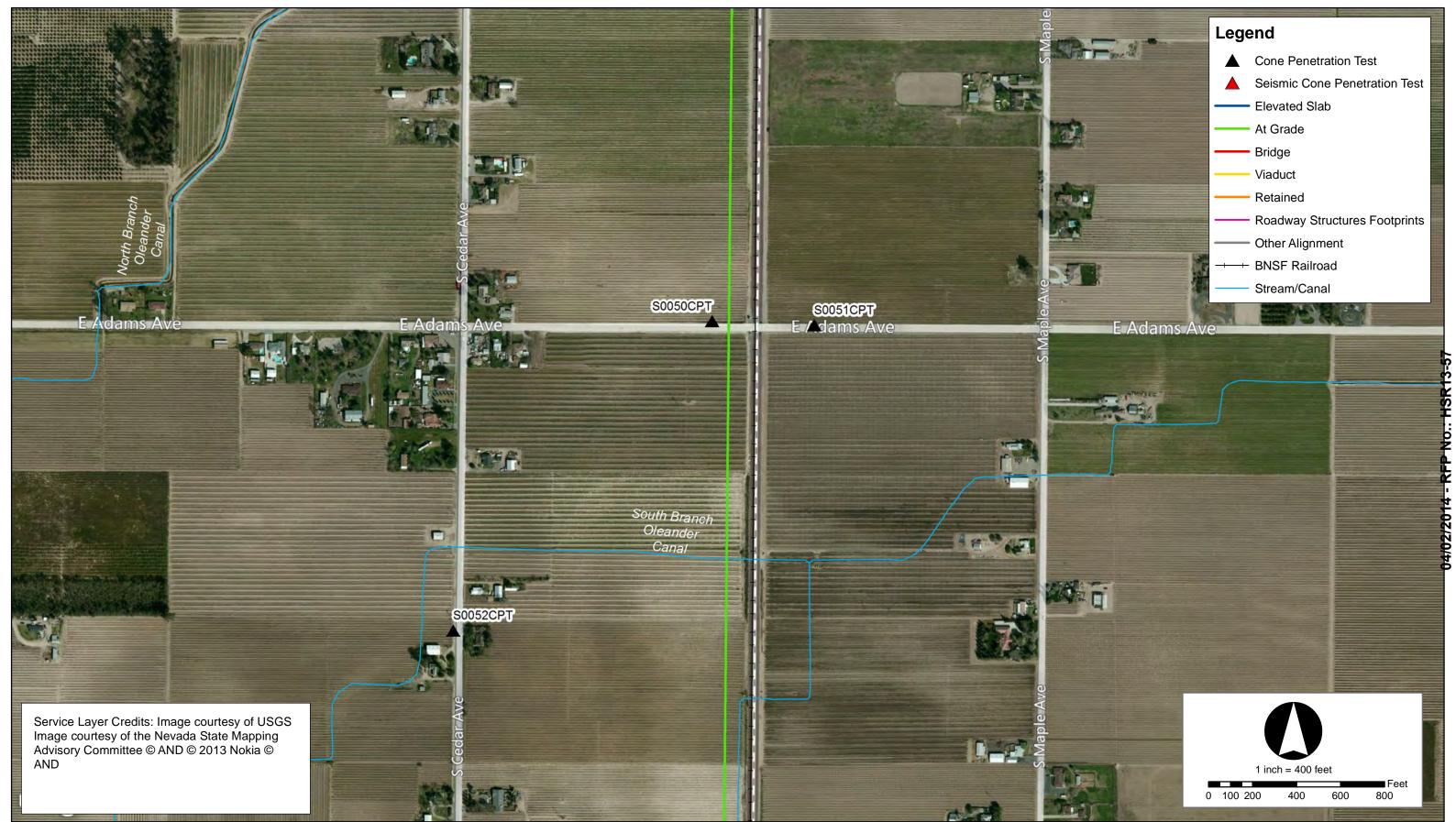






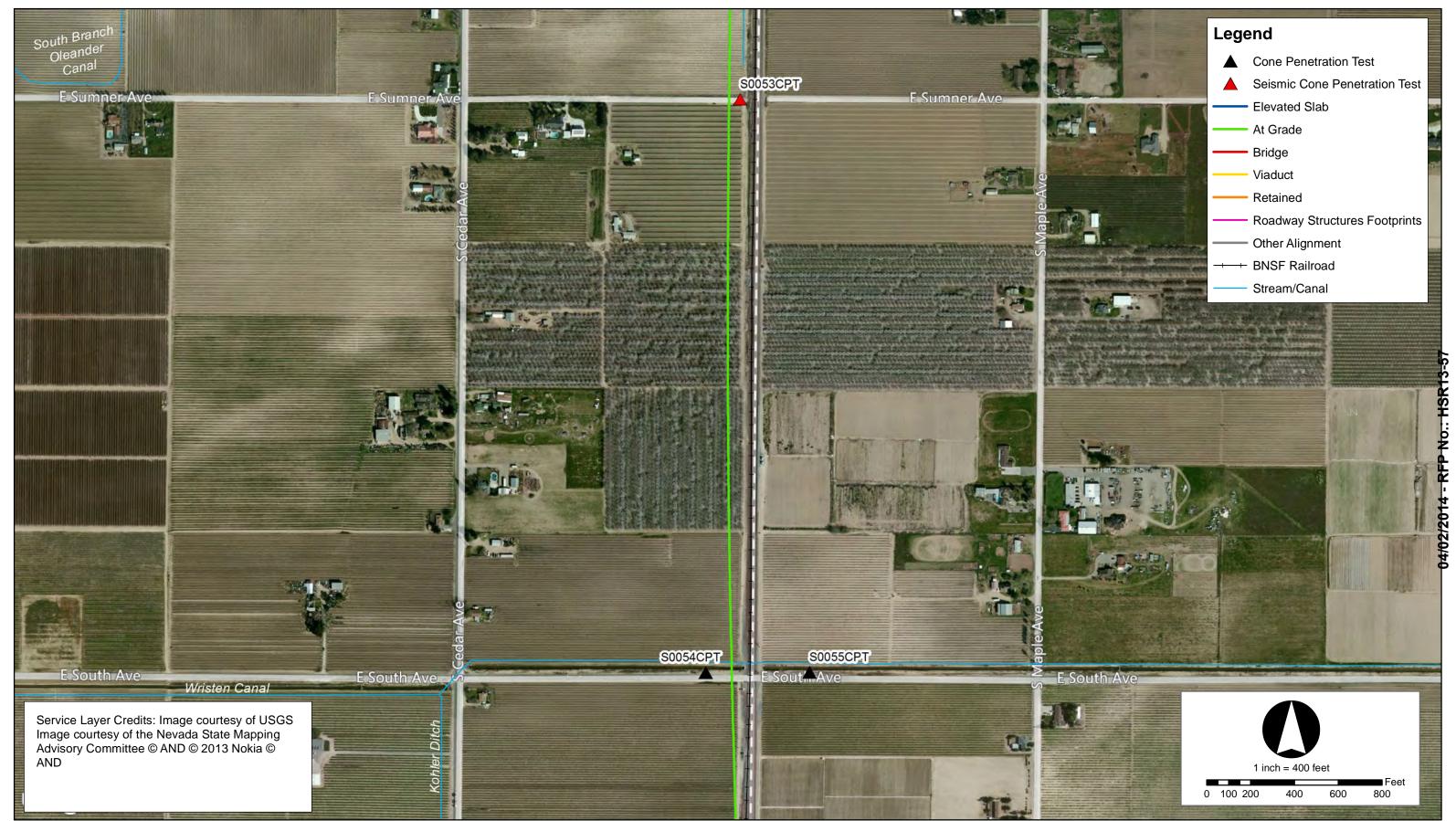






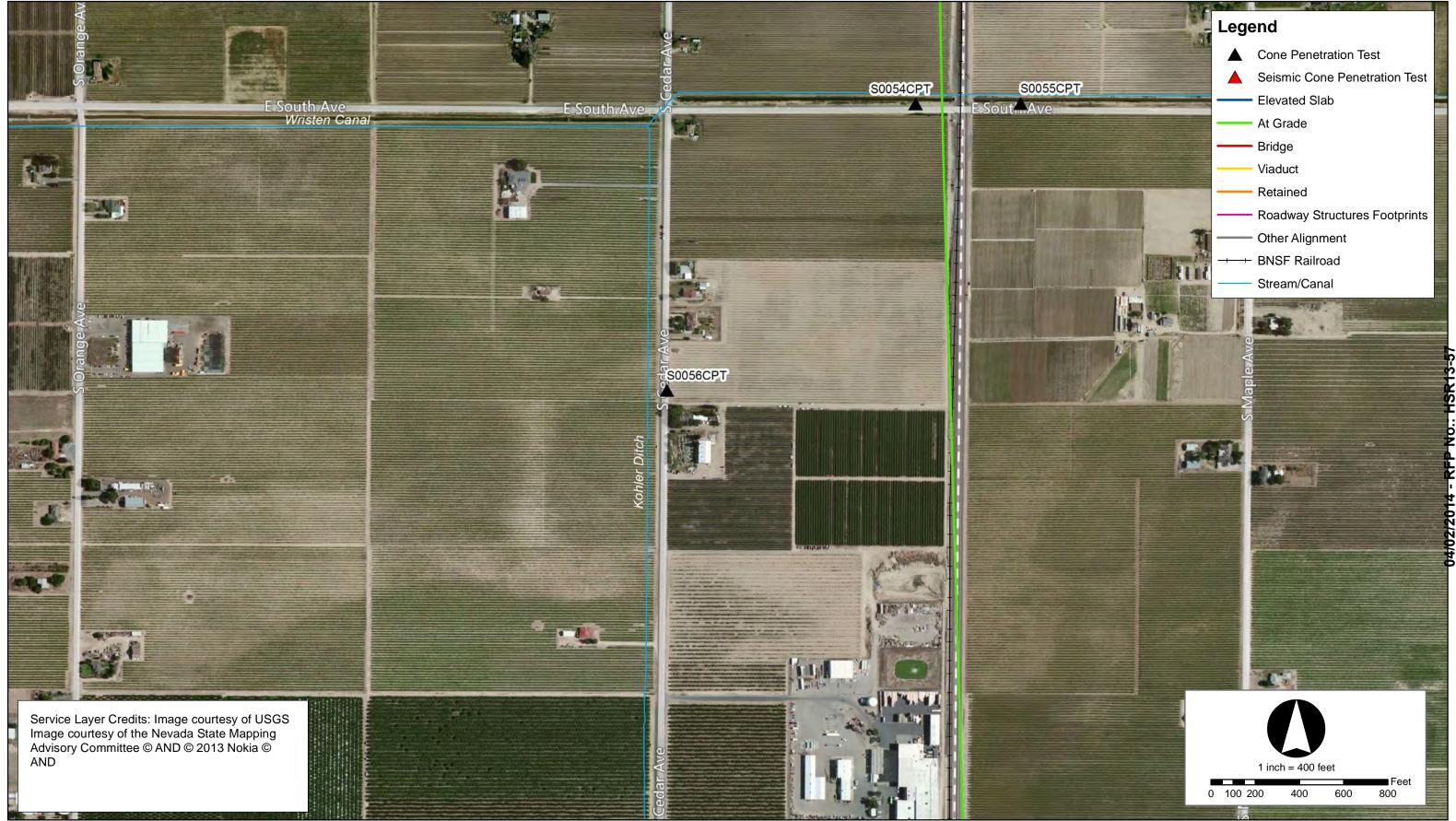






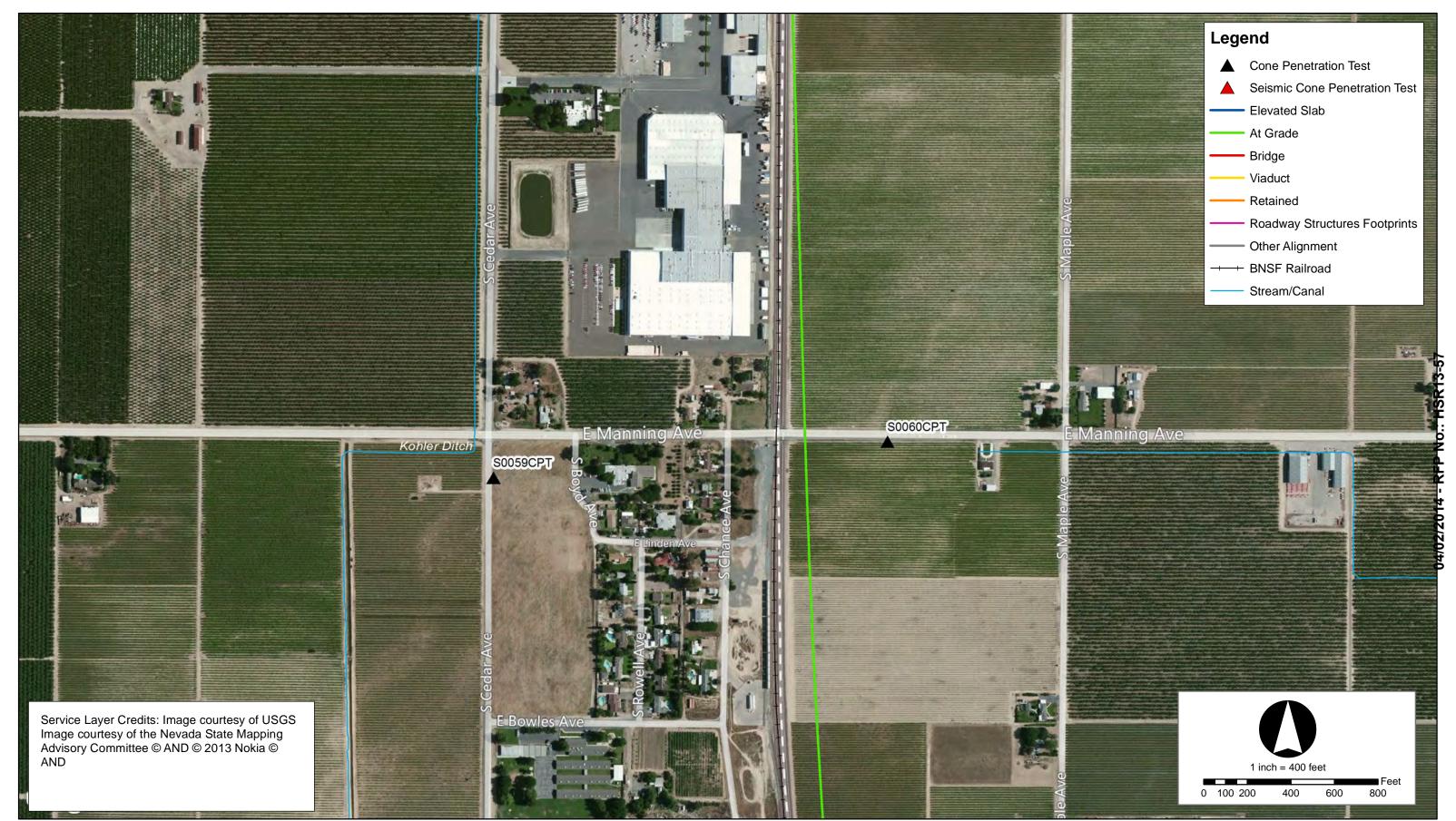






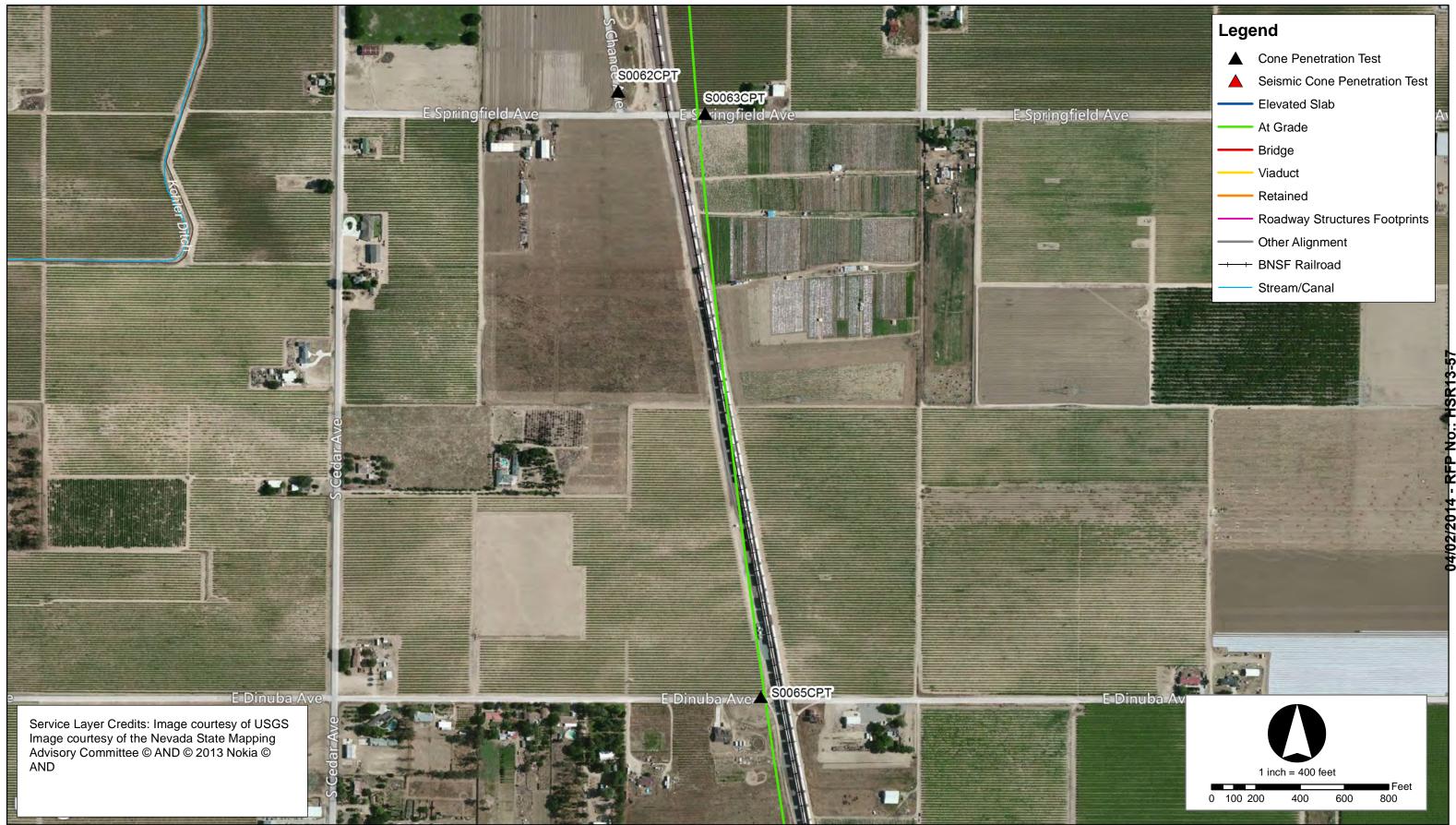


















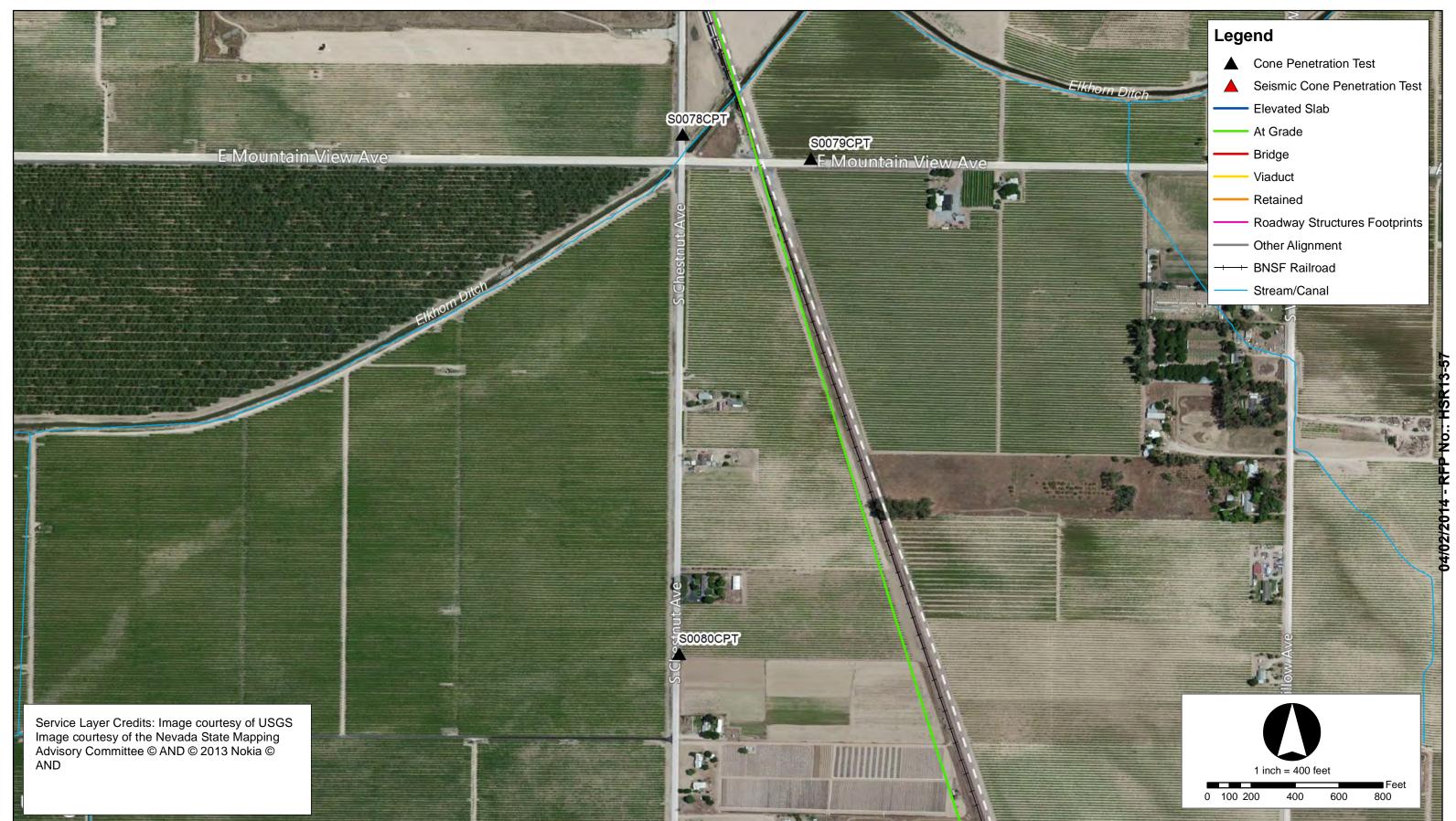






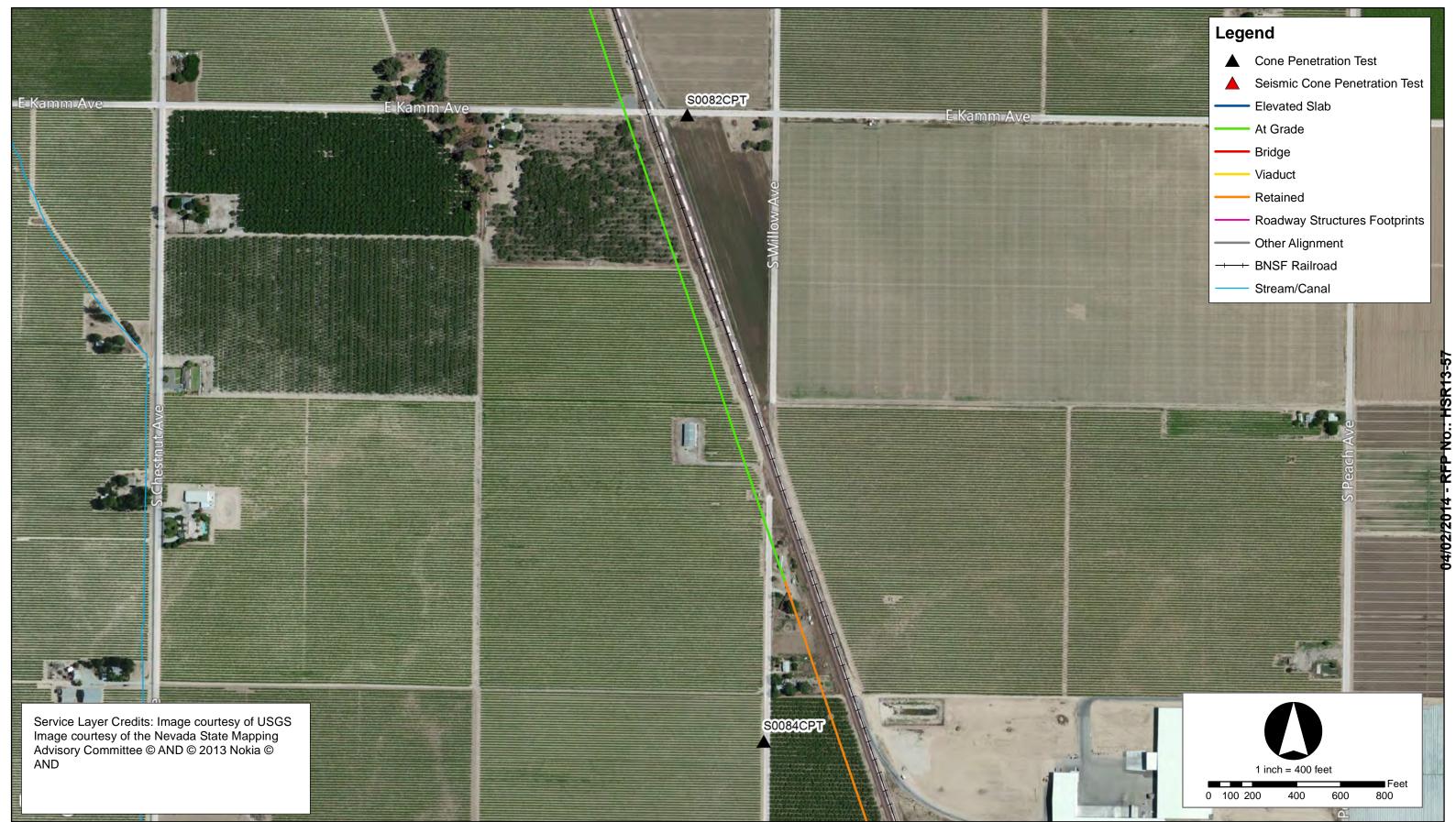


















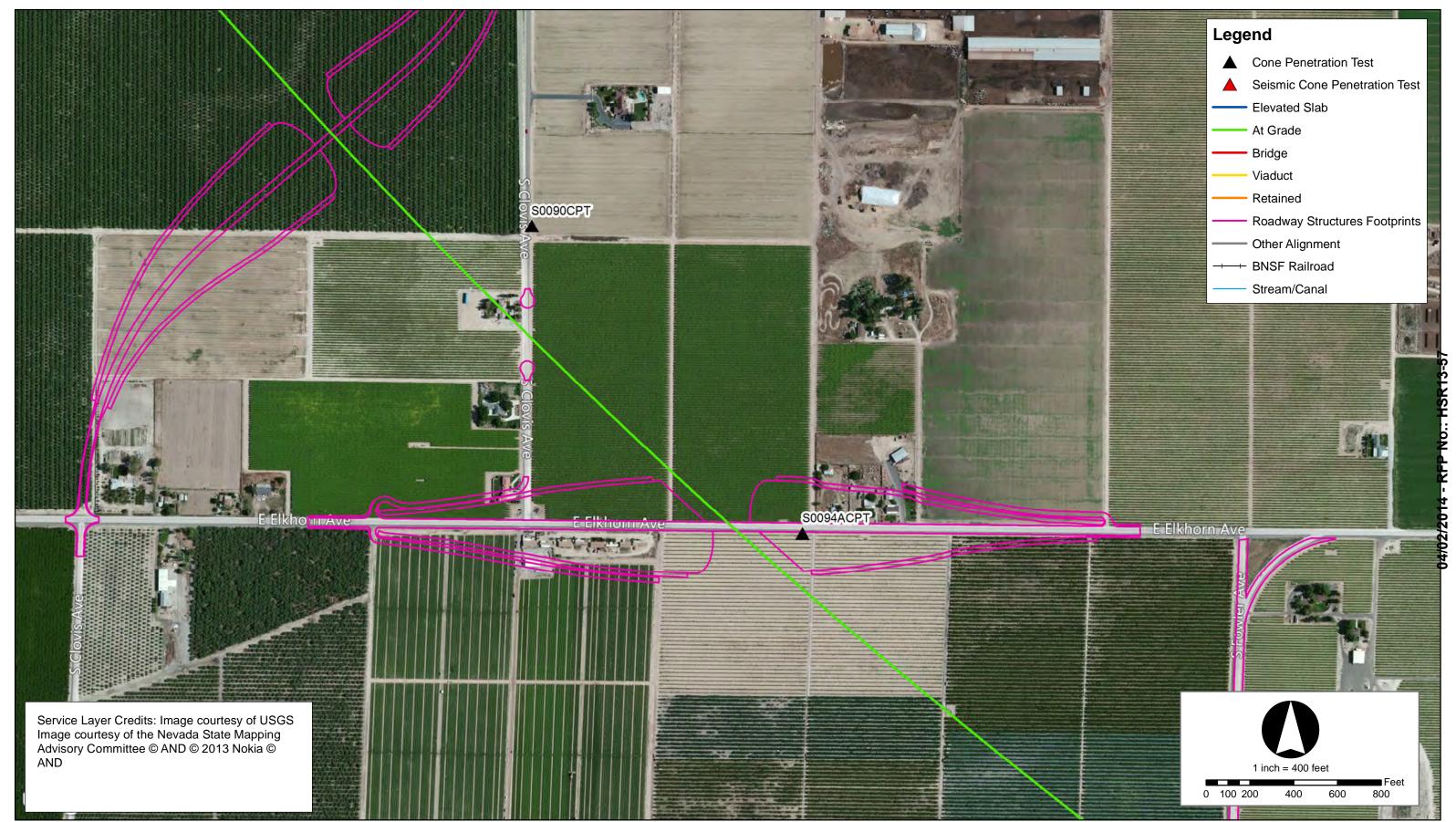












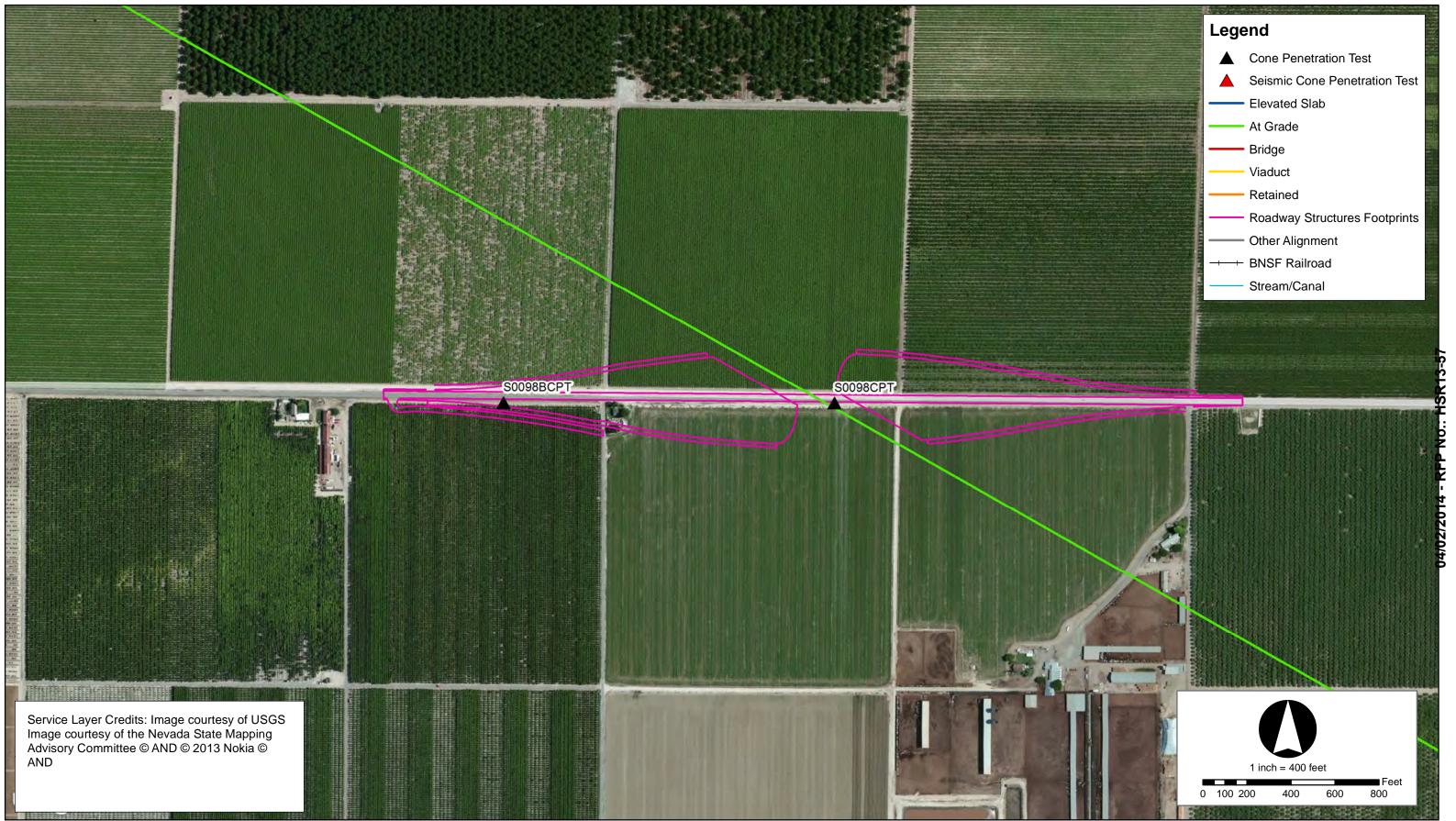














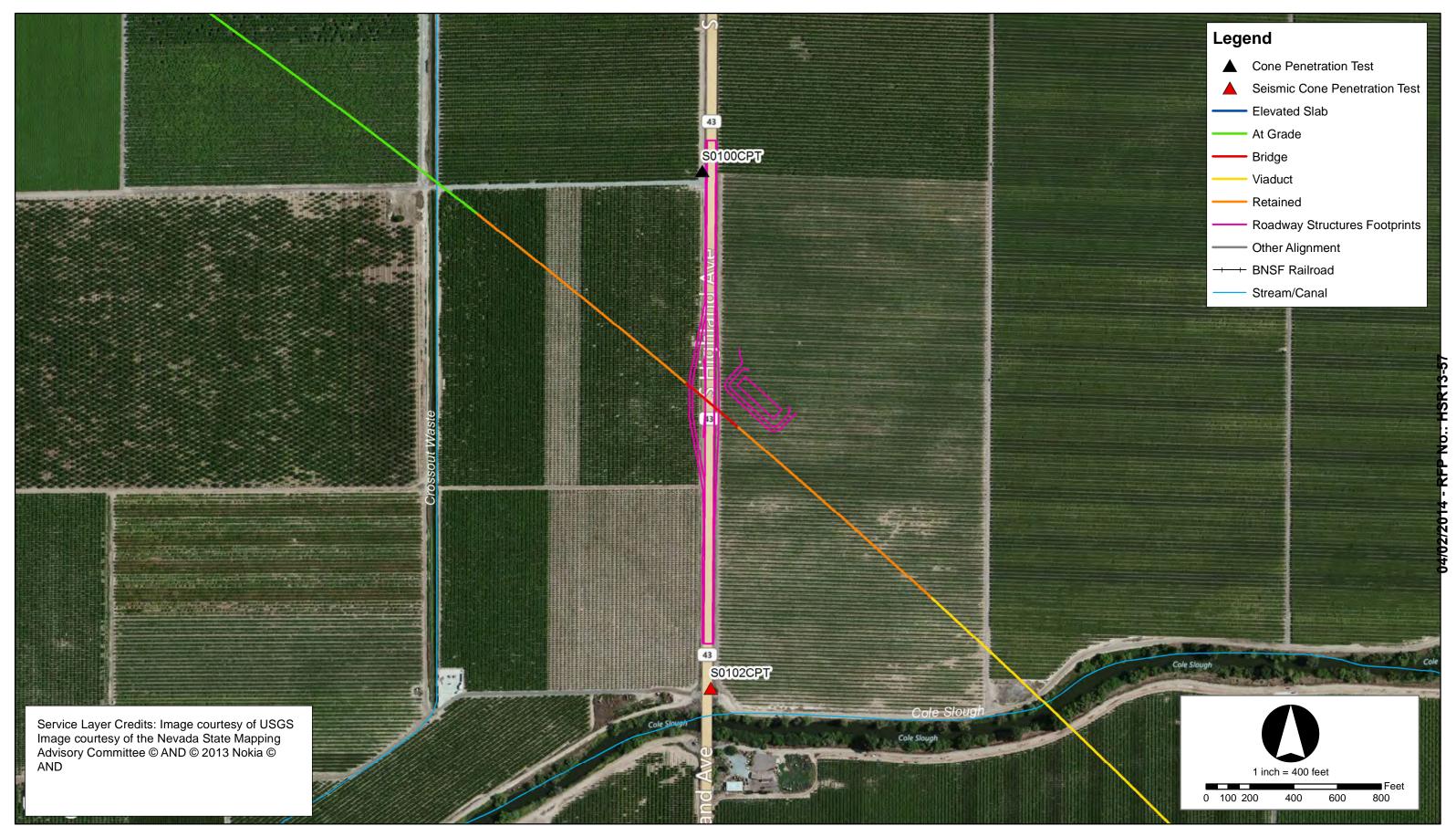


LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield







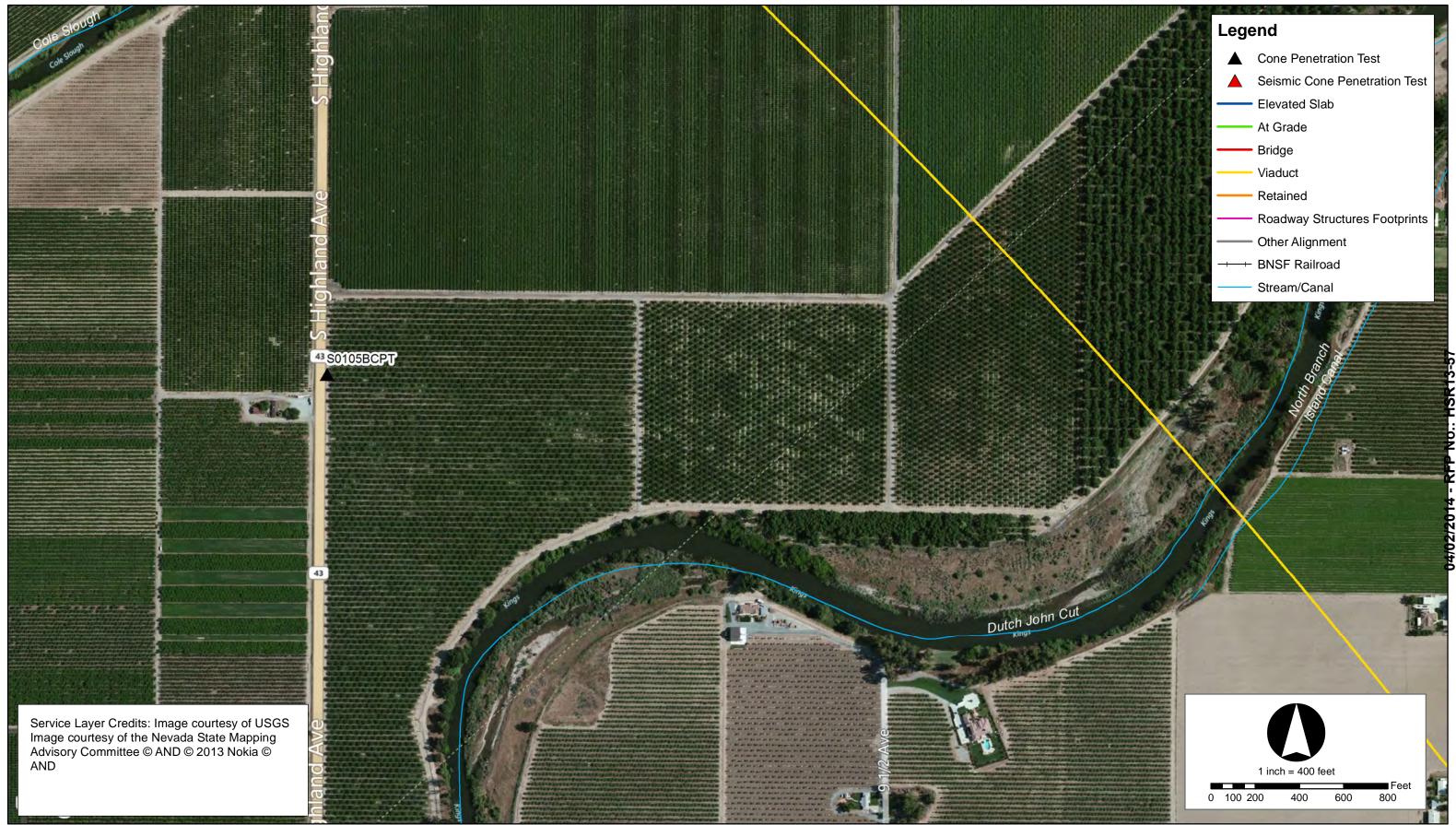






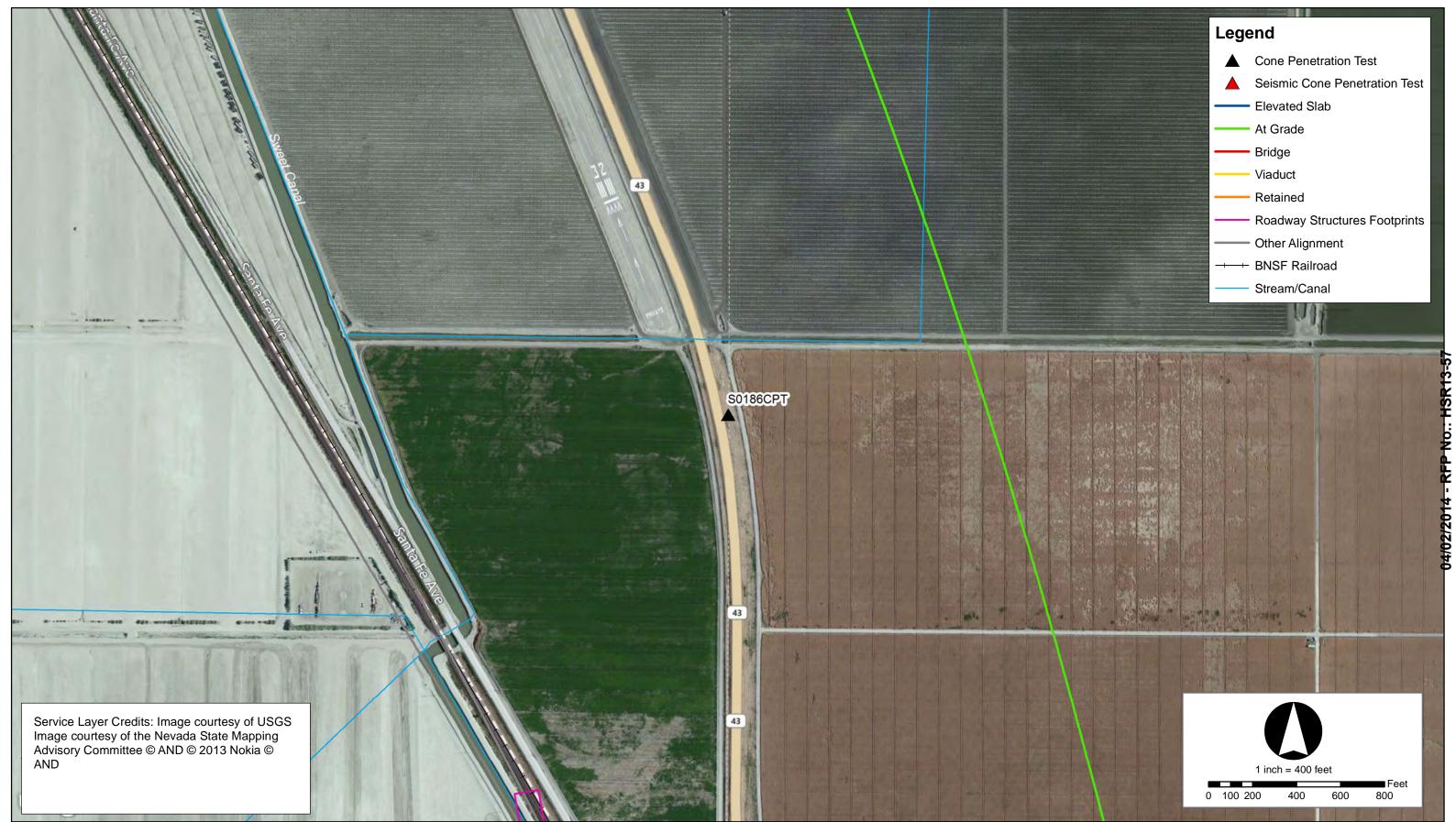
LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield

**Geotechnical Data Report - Package 2-3** 















































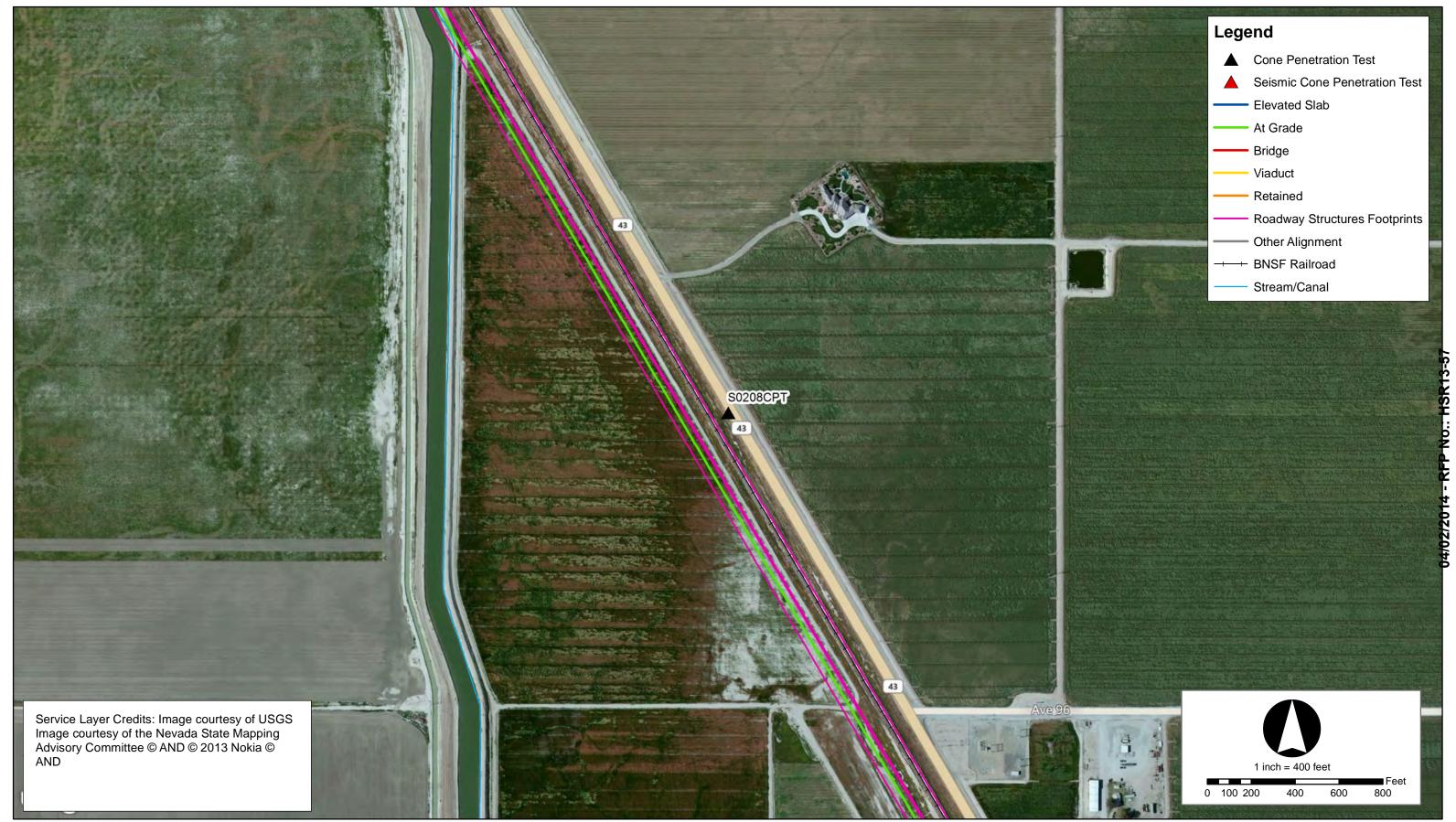








LOCATIONS OF CONE PENETRATION TESTS, THIS INVESTIGATION
California High Speed Train
Fresno to Bakersfield









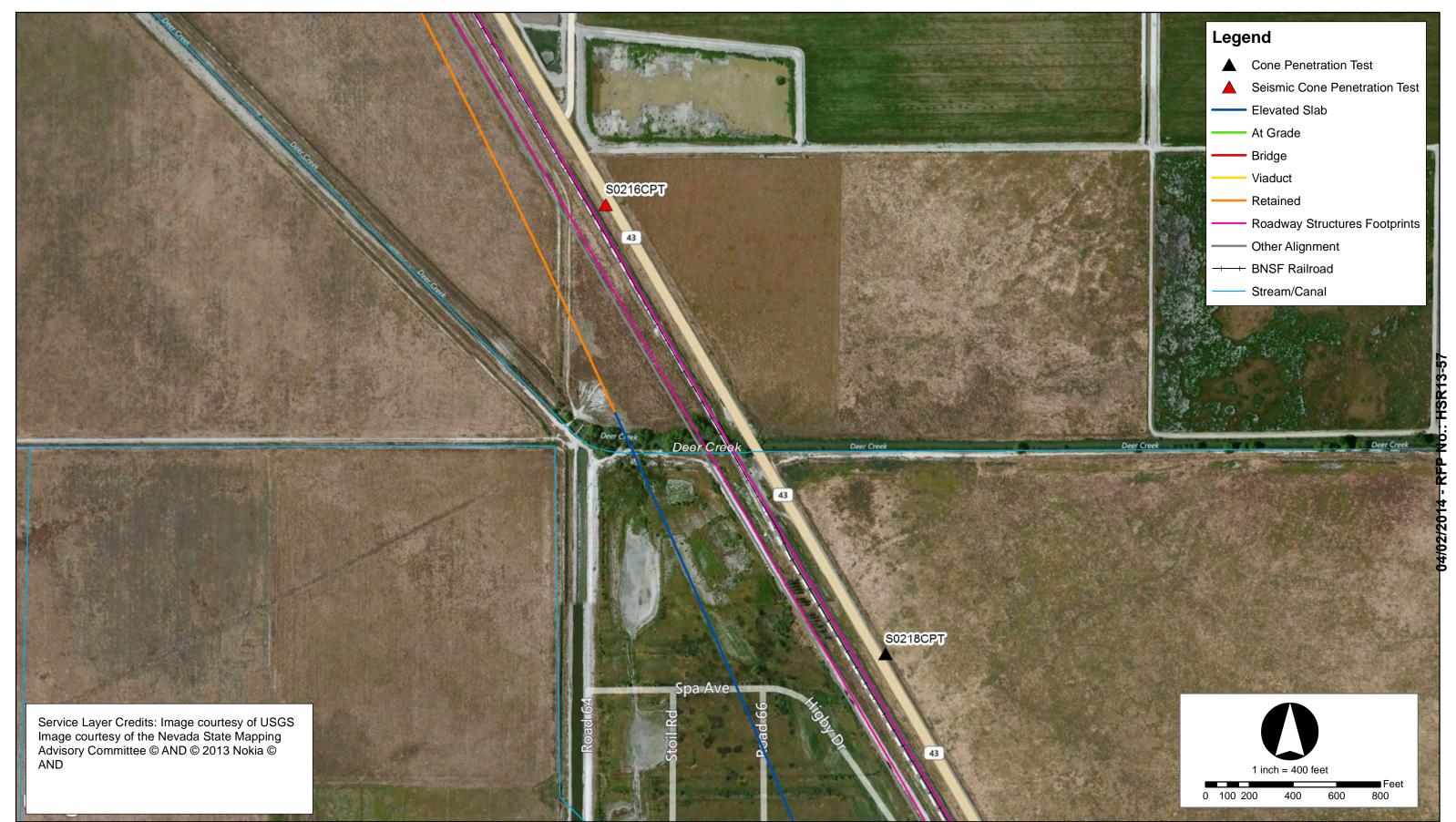












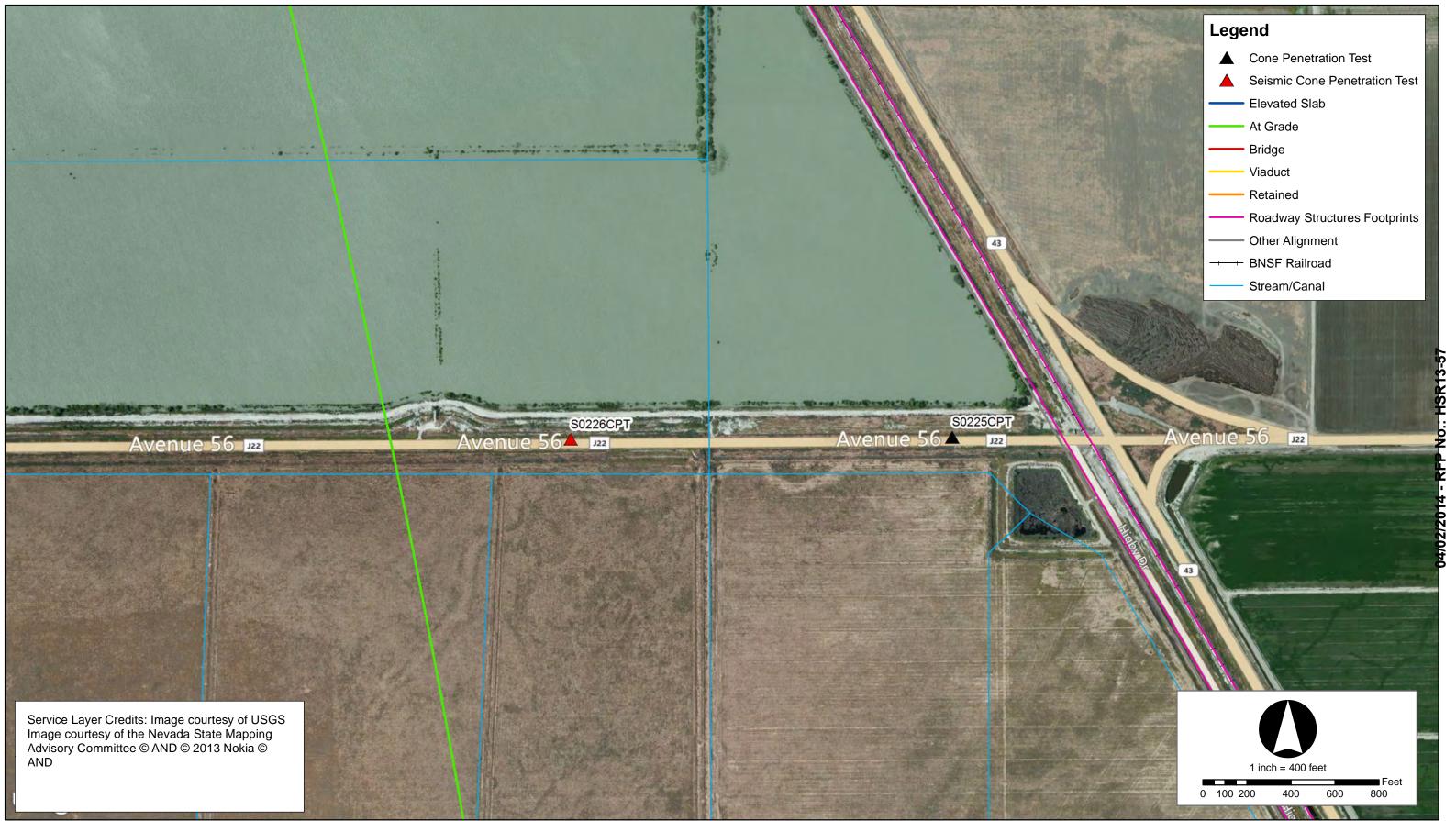












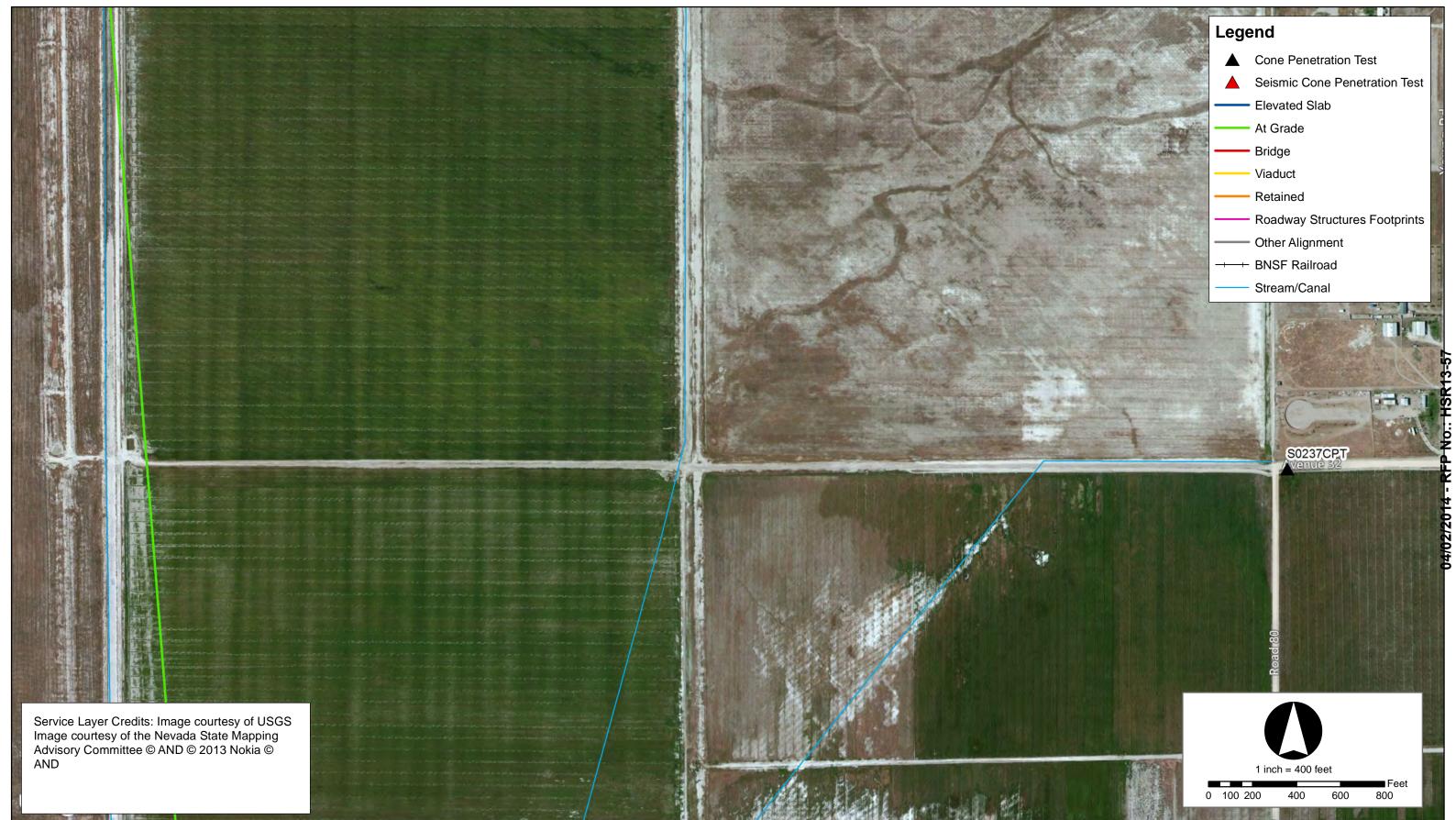




























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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

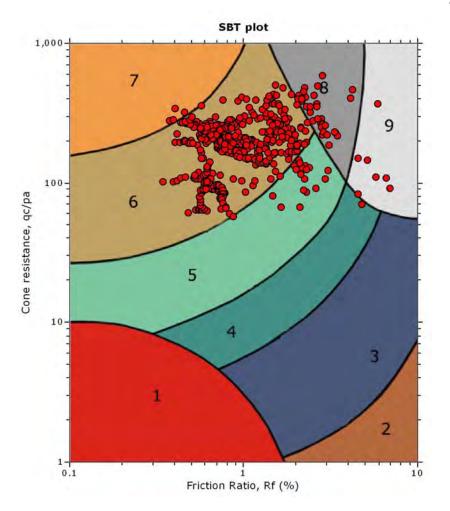
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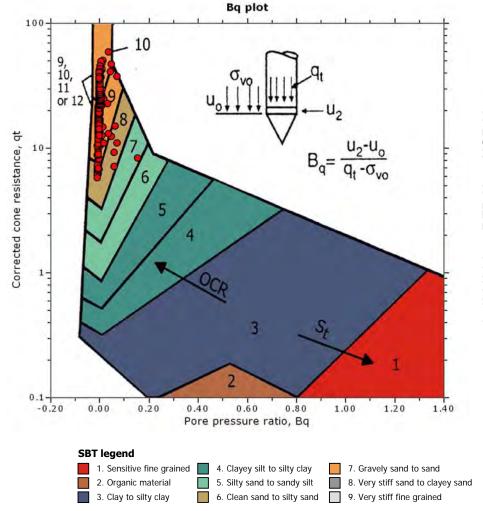
Total depth: 100.07 ft Surface Elevation: 289.74 ft

Coords: X:6341778.08, Y:2122861.09

Cone Operator: Unknown

# SBT - Bq plots



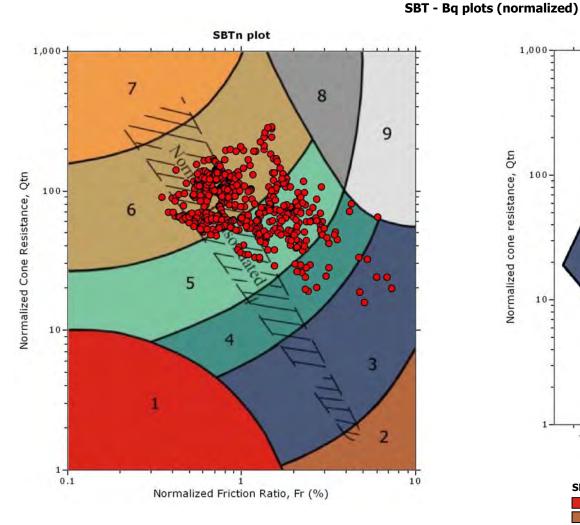


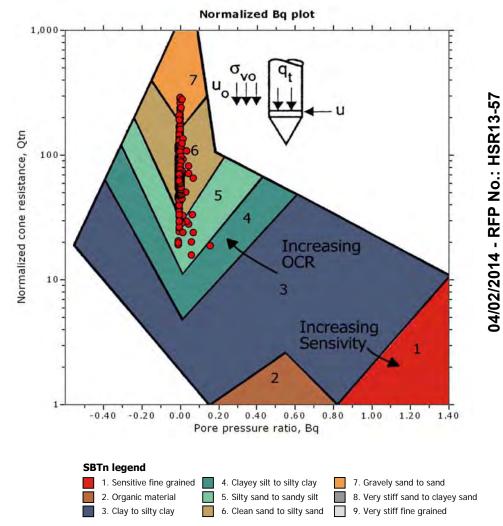


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**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 





## **URS/HMM/Arup Joint Venture**



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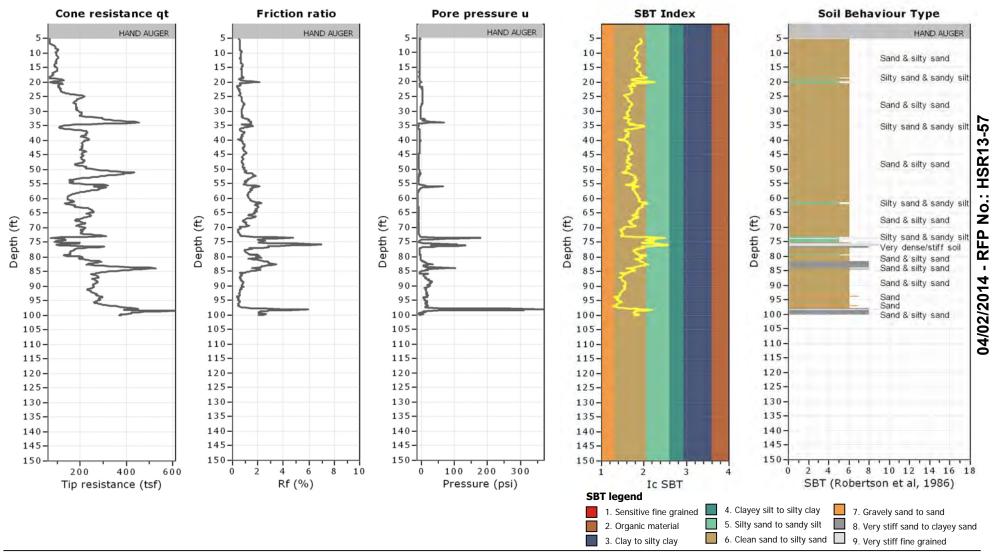
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0044CPT

Total depth: 100.07 ft

Surface Elevation: 289.74 ft Coords: X:6341778.08. Y:2122861.09



## **URS/HMM/Arup Joint Venture**



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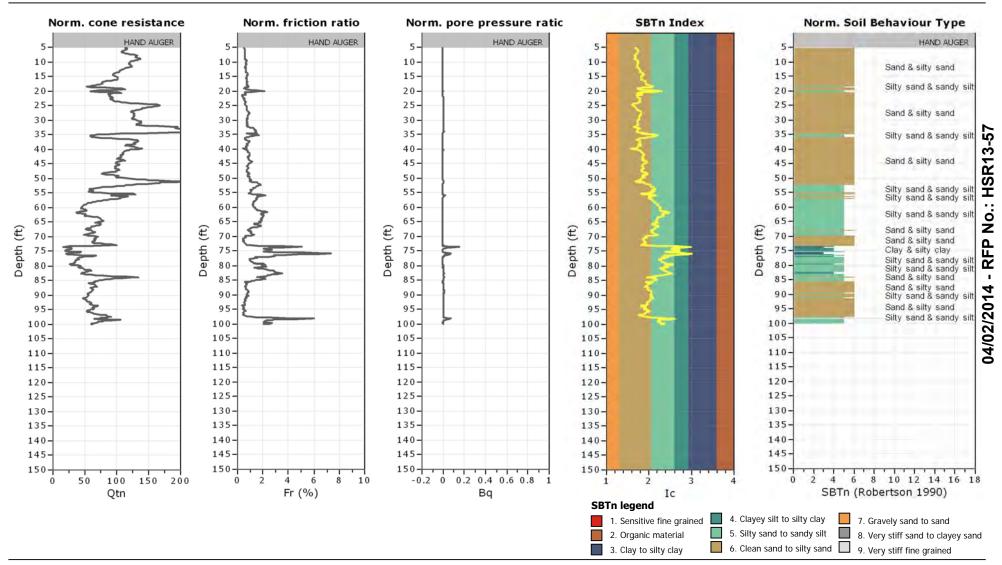
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0044CPT

Total depth: 100.07 ft Surface Elevation: 289.74 ft

Coords: X:6341778.08, Y:2122861.09



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**Project: California High-Speed Train** 

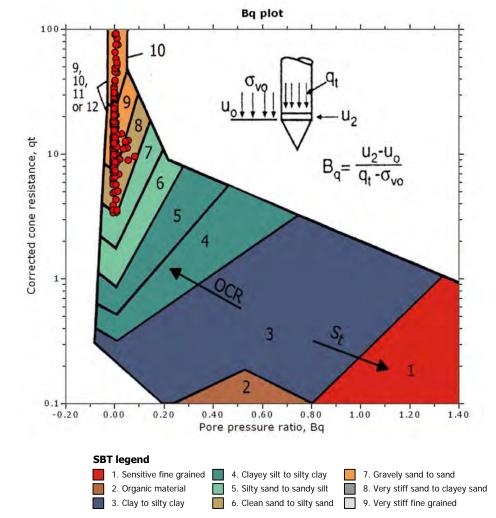
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CPT: S0045ACPT

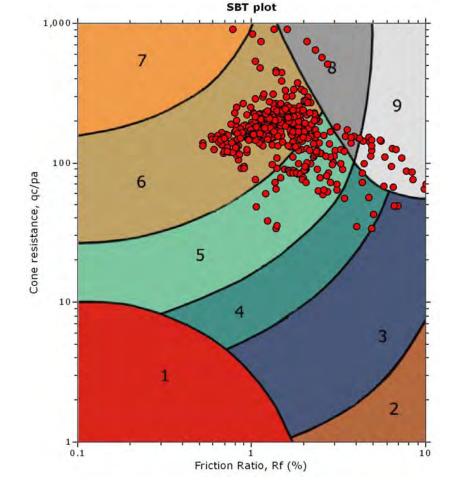
Total depth: 100.23 ft

Surface Elevation: 287.86 ft

Coords: X:6341421.24, Y:2120178.15



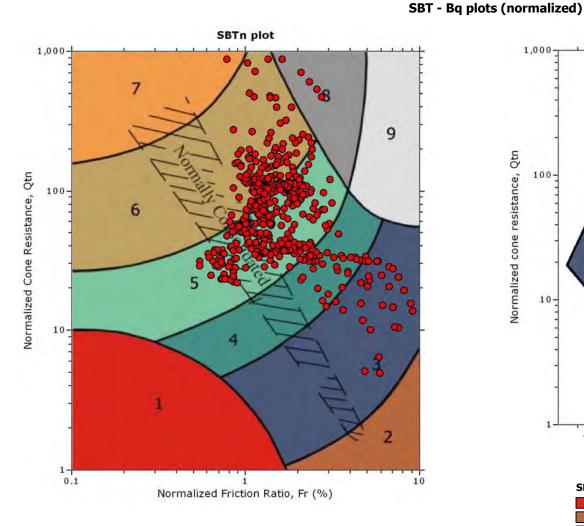


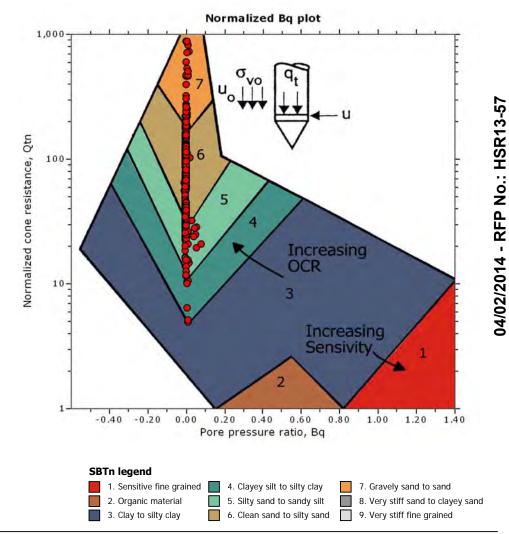


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**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 





## **URS/HMM/Arup Joint Venture**



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**Project: California High-Speed Train** 

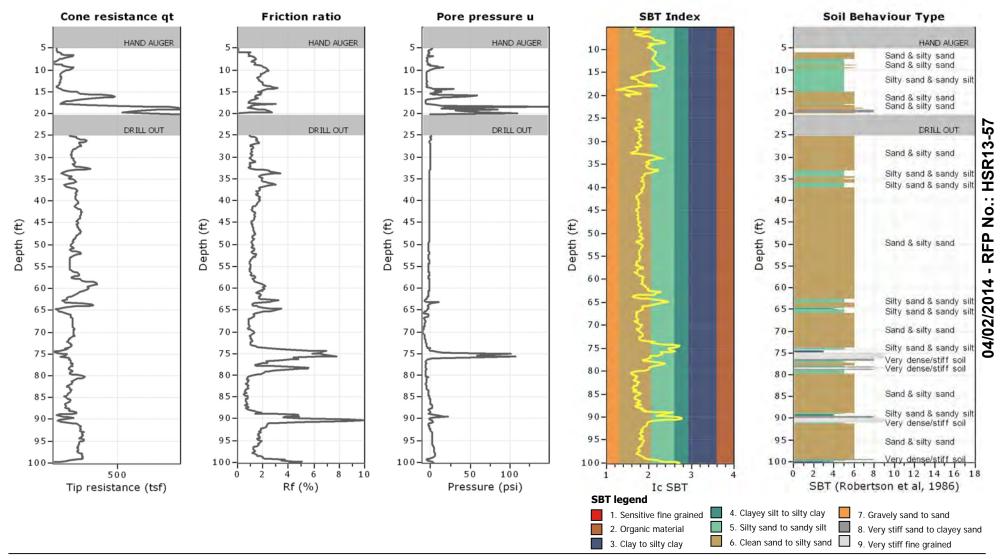
Location: Fresno-Bakersfield

CPT: S0045ACPT

Total depth: 100.23 ft

Surface Elevation: 287.86 ft

Coords: X:6341421.24, Y:2120178.15



## **URS/HMM/Arup Joint Venture**



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**Project: California High-Speed Train** 

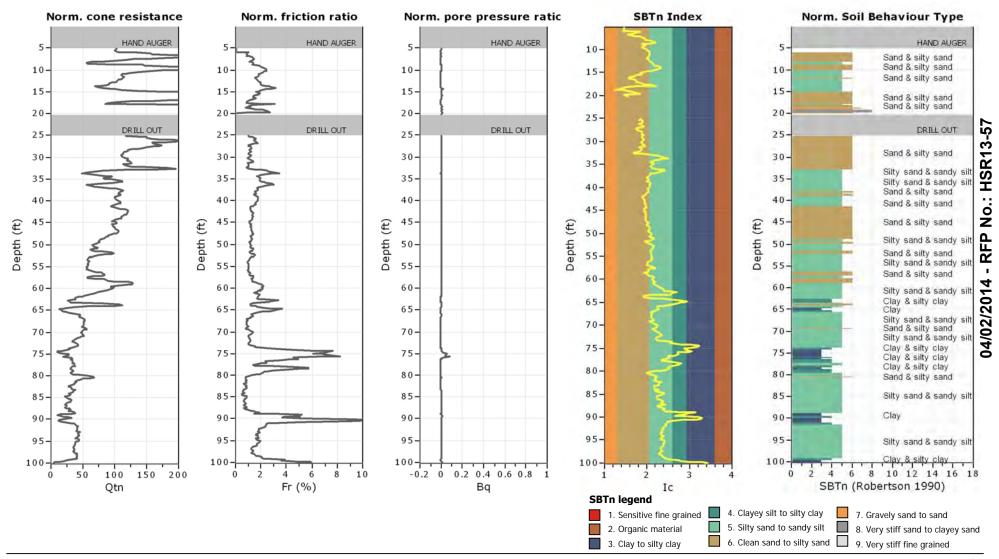
Location: Fresno-Bakersfield

CPT: S0045ACPT

Total depth: 100.23 ft

Surface Elevation: 287.86 ft

Coords: X:6341421.24, Y:2120178.15





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

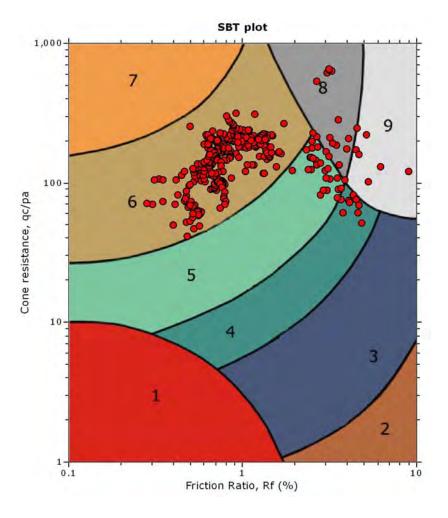
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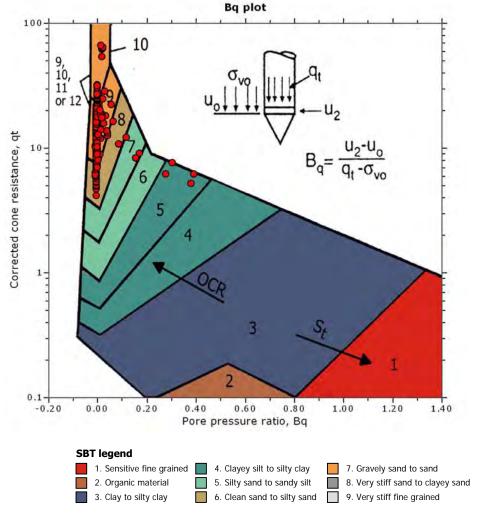
Total depth: 71.36 ft

Surface Elevation: 290.19 ft

Coords: X:6340277.33, Y:2121584.41

Cone Operator: Unknown





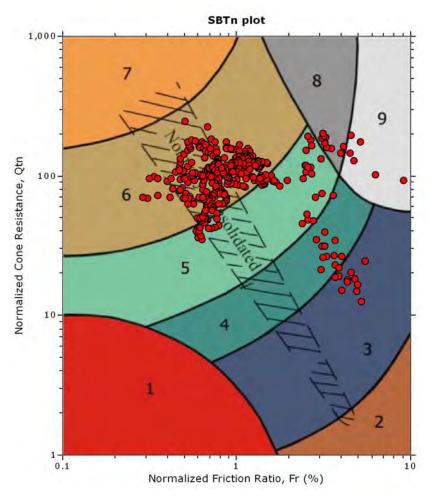


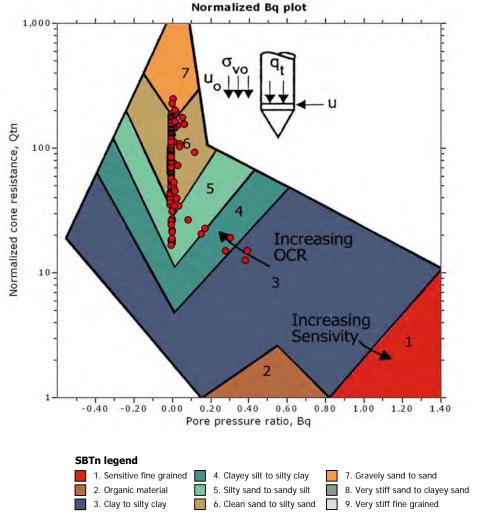
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Surface Elevation: 290.19 ft Coords: X:6340277.33, Y:2121584.41

Cone Operator: Unknown







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**Project: California High-Speed Train** 

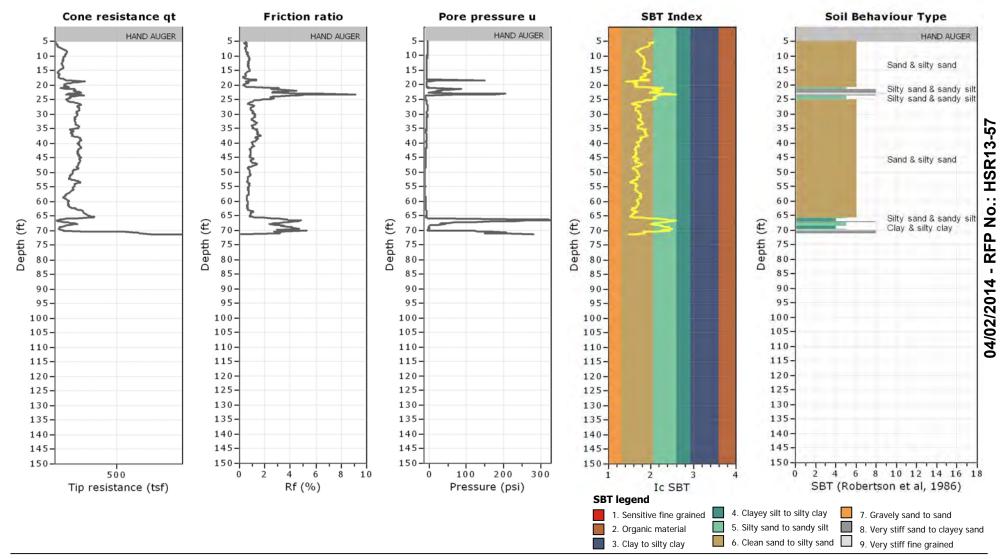
Location: Fresno-Bakersfield

CPT: S0045CPT

Total depth: 71.36 ft

Surface Elevation: 290.19 ft

Coords: X:6340277.33, Y:2121584.41





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**Project: California High-Speed Train** 

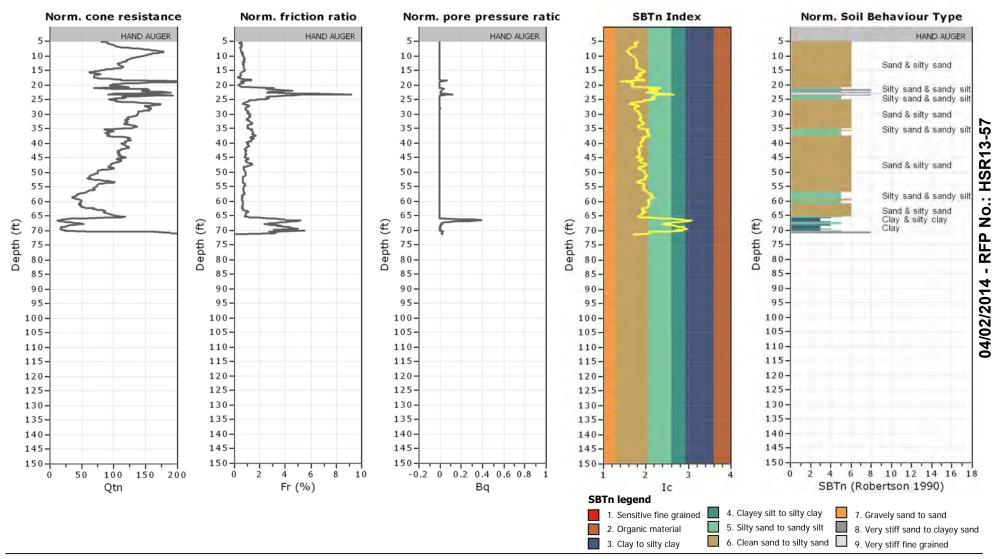
Location: Fresno-Bakersfield

CPT: S0045CPT

Total depth: 71.36 ft

Surface Elevation: 290.19 ft

Coords: X:6340277.33, Y:2121584.41



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

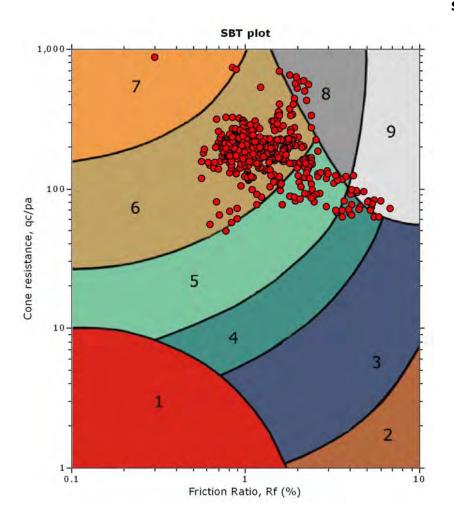
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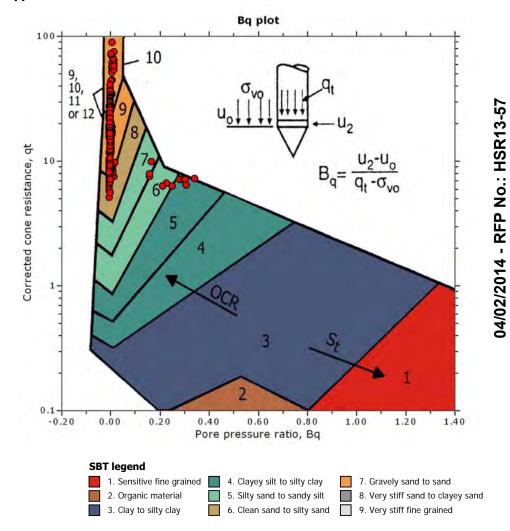
Total depth: 100.07 ft

Surface Elevation: 288.89 ft

Coords: X:6341291.46, Y:2118887.82

Cone Operator: Unknown



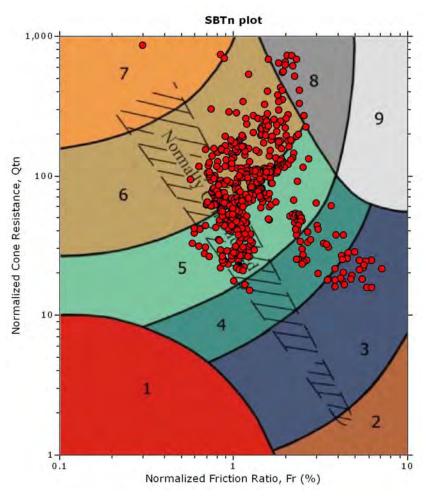


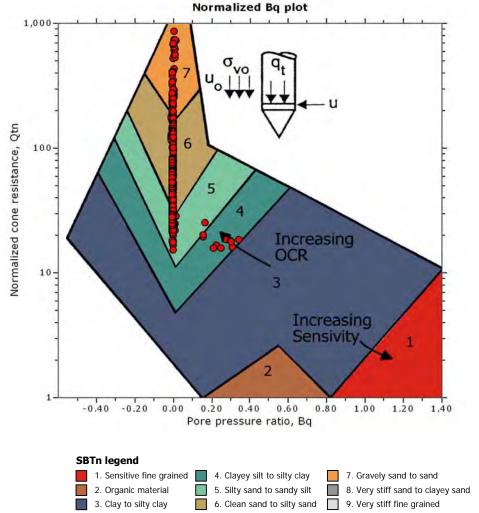
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 100.07 ft Surface Elevation: 288.89 ft Coords: X:6341291.46, Y:2118887.82

Cone Operator: Unknown







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**Project: California High-Speed Train** 

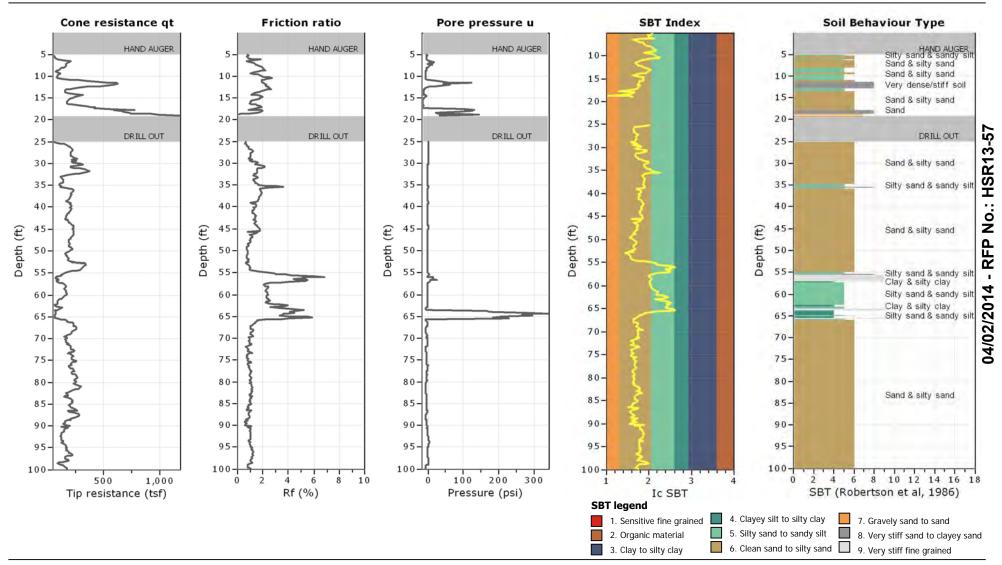
Location: Fresno-Bakersfield

CPT: S0046CPT

Total depth: 100.07 ft

Surface Elevation: 288.89 ft

Coords: X:6341291.46, Y:2118887.82





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**Project: California High-Speed Train** 

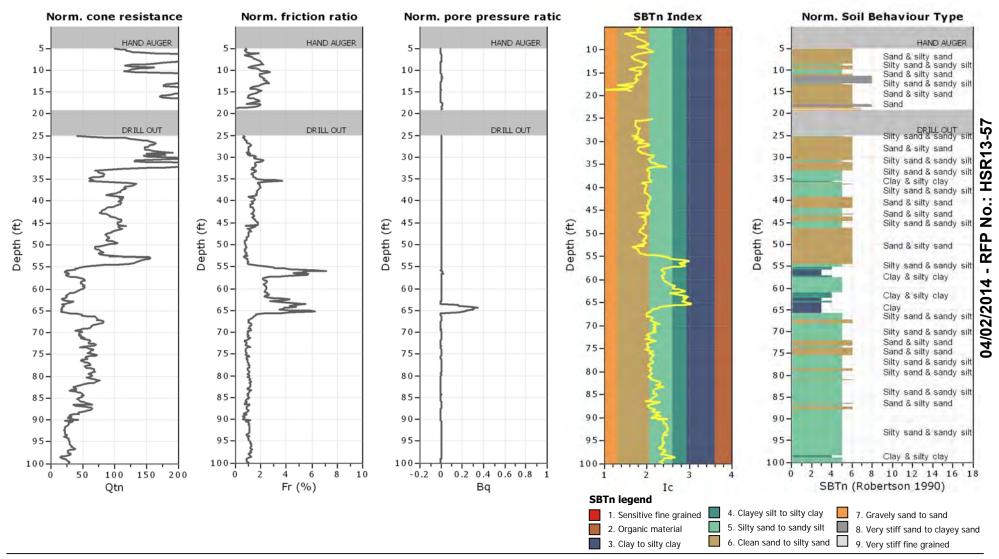
Location: Fresno-Bakersfield

CPT: S0046CPT

Total depth: 100.07 ft

Surface Elevation: 288.89 ft

Coords: X:6341291.46, Y:2118887.82



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

1,000-

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0.1

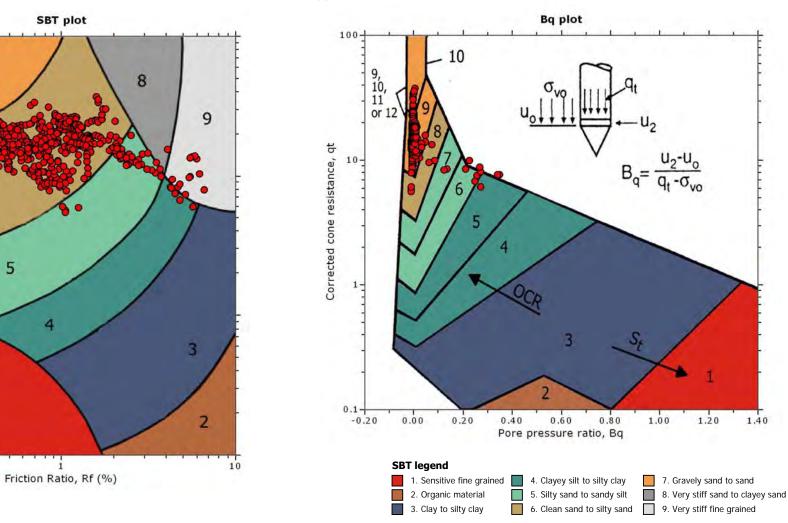
Cone resistance, qc/pa

CPT: S0047CPT

Total depth: 100.07 ft

Surface Elevation: 289.50 ft Coords: X:6341289.75, Y:2117581.56

Cone Operator: Unknown

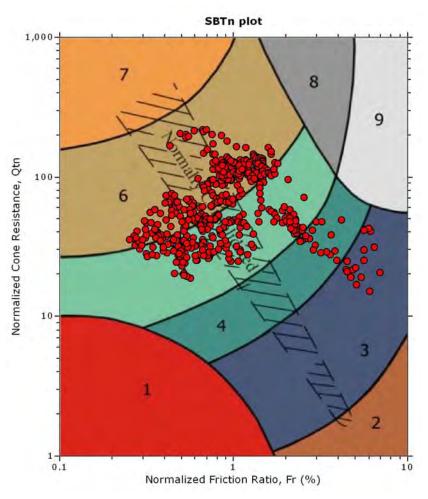


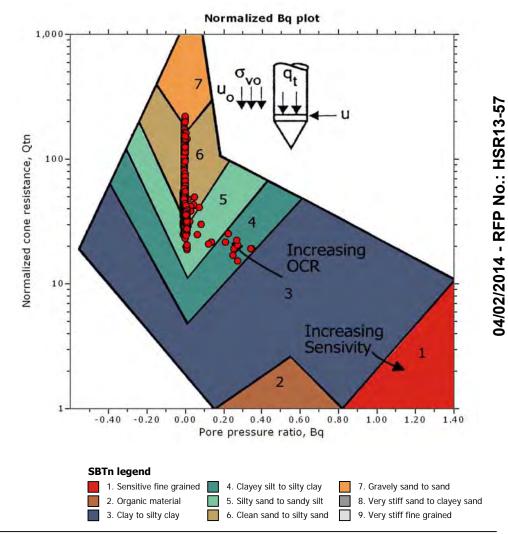
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

Total depth: 100.07 ft Surface Elevation: 289.50 ft Coords: X:6341289.75, Y:2117581.56

Cone Operator: Unknown







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**Project: California High-Speed Train** 

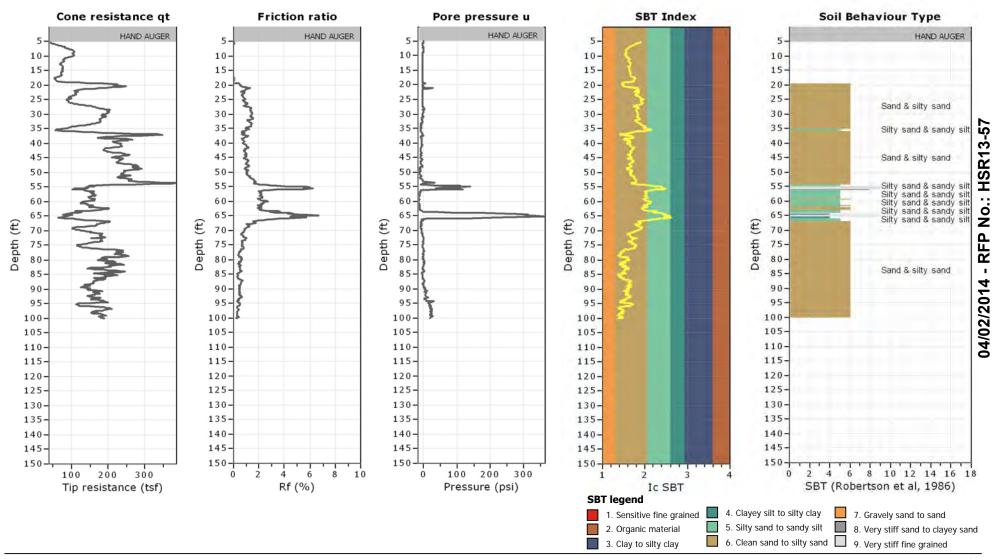
Location: Fresno-Bakersfield

CPT: S0047CPT

Total depth: 100.07 ft

Surface Elevation: 289.50 ft

Coords: X:6341289.75, Y:2117581.56





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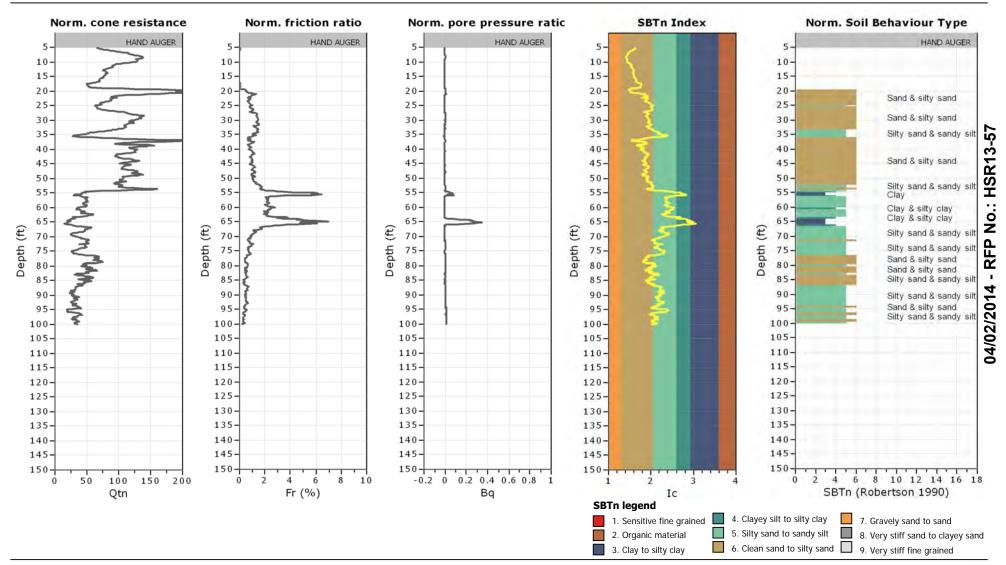
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0047CPT

Total depth: 100.07 ft Surface Elevation: 289.50 ft

Coords: X:6341289.75, Y:2117581.56



CPT: S0048CPT

Total depth: 100.07 ft Surface Elevation: 289.59 ft

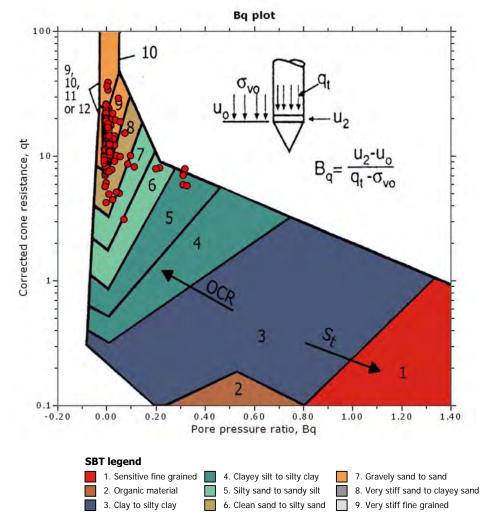
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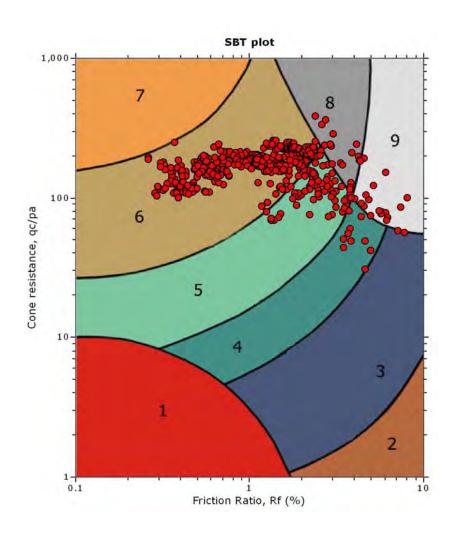
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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

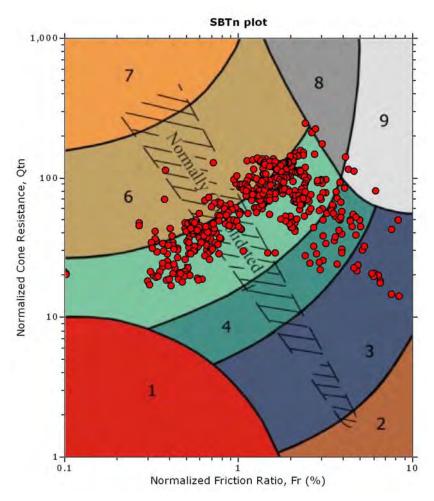
URS HMM ARUP

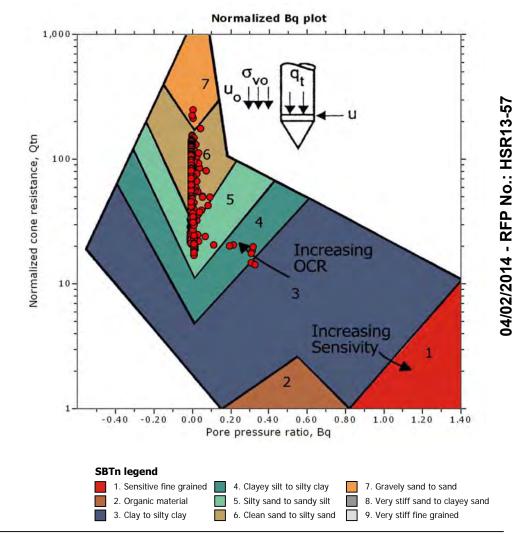




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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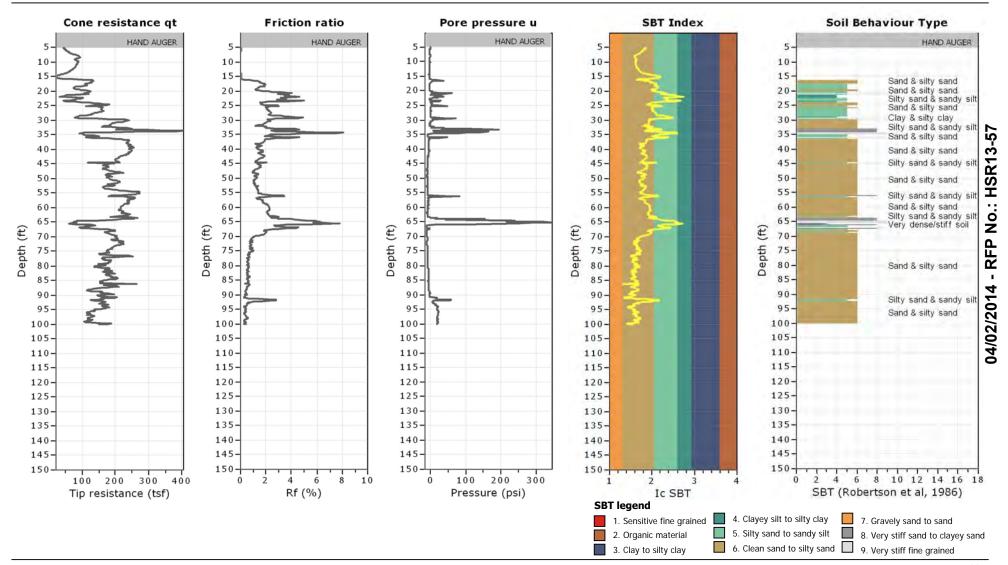
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0048CPT

Total depth: 100.07 ft

Surface Elevation: 289.59 ft Coords: X:6341793.57, Y:2117553.96





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**Project: California High-Speed Train** 

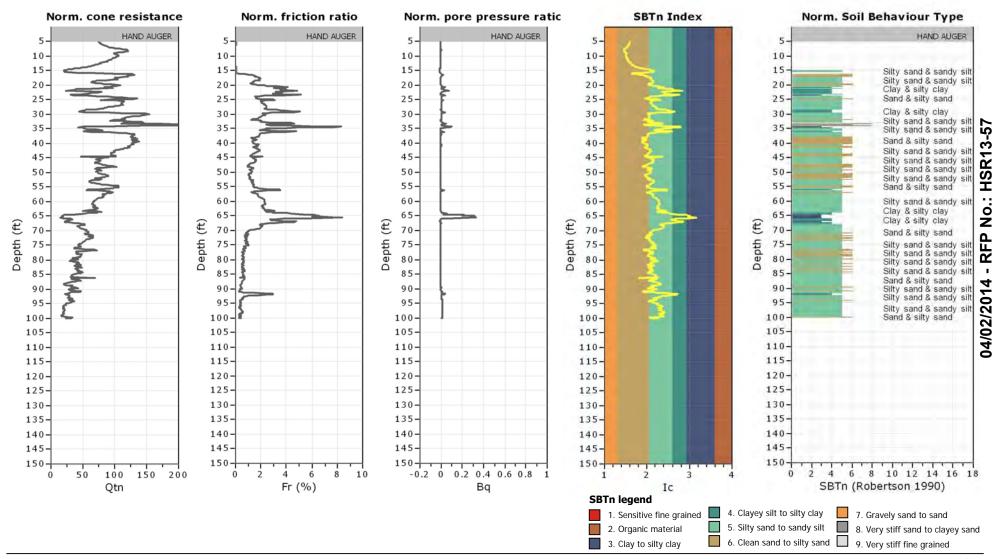
Location: Fresno-Bakersfield

CPT: S0048CPT

Total depth: 100.07 ft

Surface Elevation: 289.59 ft

Coords: X:6341793.57, Y:2117553.96





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

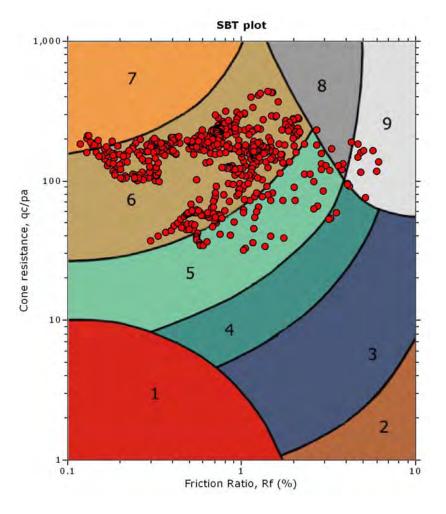
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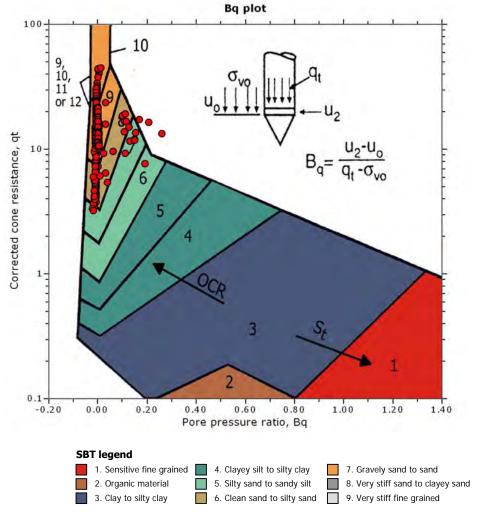
Total depth: 100.23 ft

Surface Elevation: 286.26 ft

Coords: X:6340230.73, Y:2116588.32

Cone Operator: Unknown

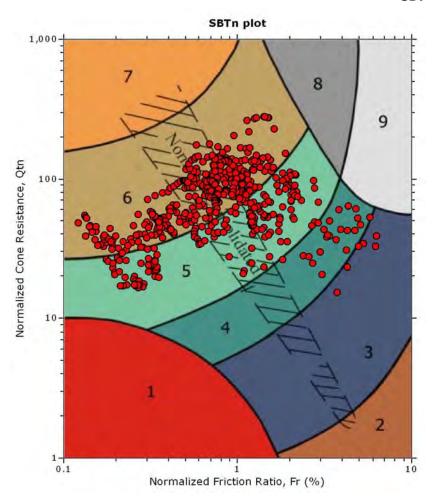


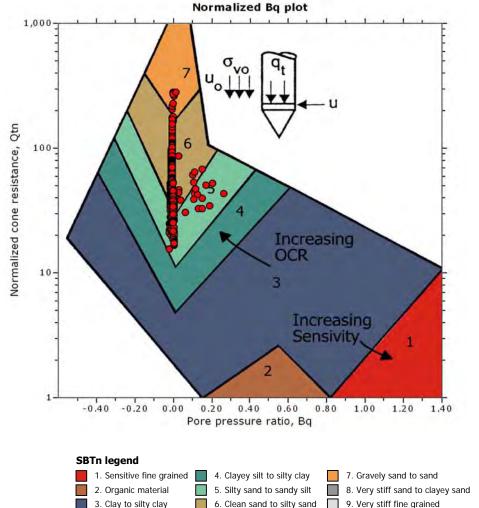




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







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**Project: California High-Speed Train** 

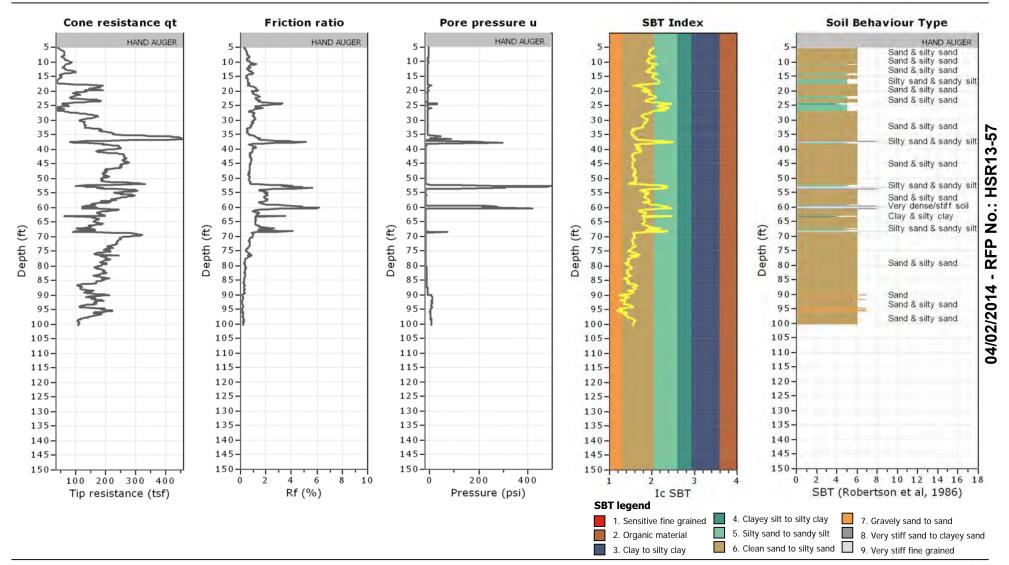
Location: Fresno-Bakersfield

CPT: S0049CPT

Total depth: 100.23 ft

Surface Elevation: 286.26 ft

Coords: X:6340230.73, Y:2116588.32





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**Project: California High-Speed Train** 

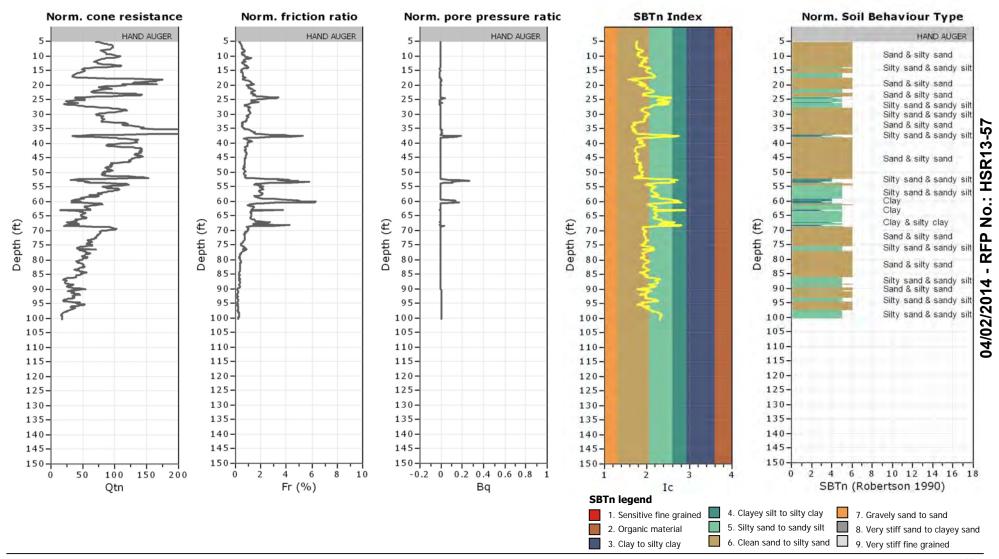
Location: Fresno-Bakersfield

CPT: S0049CPT

Total depth: 100.23 ft

Surface Elevation: 286.26 ft

Coords: X:6340230.73, Y:2116588.32



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

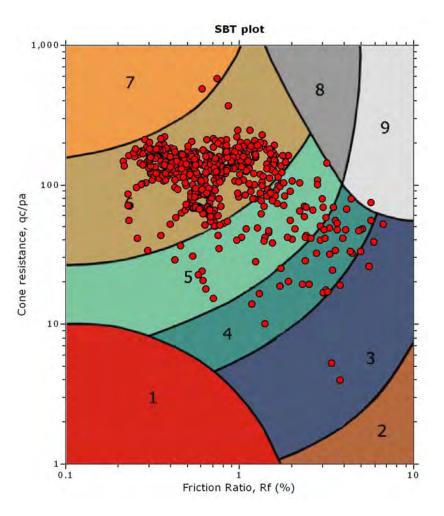
CPT: S0050CPT

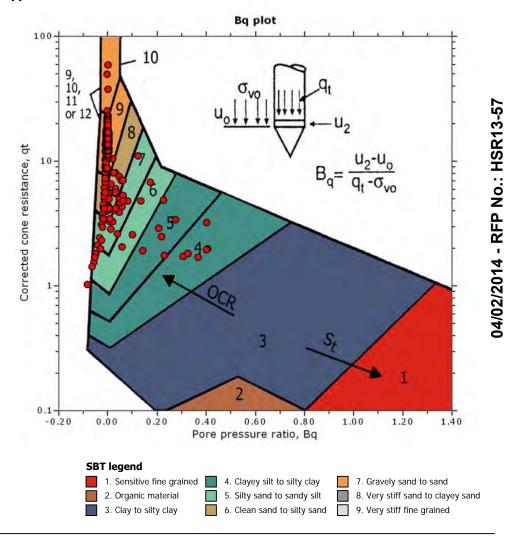
Total depth: 100.07 ft

Surface Elevation: 285.91 ft

Coords: X:6341333.44, Y:2114953.02

Cone Operator: Unknown



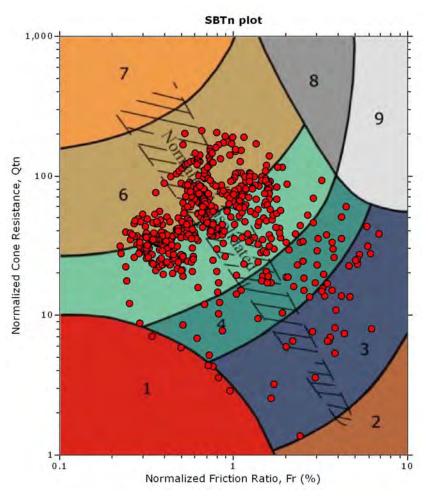


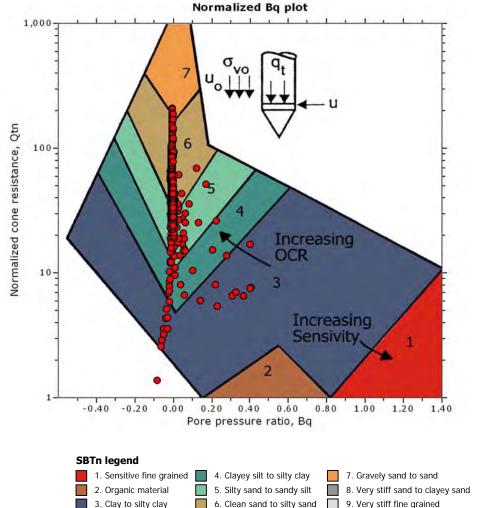
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

Total depth: 100.07 ft Surface Elevation: 285.91 ft Coords: X:6341333.44, Y:2114953.02

Cone Operator: Unknown







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**Project: California High-Speed Train** 

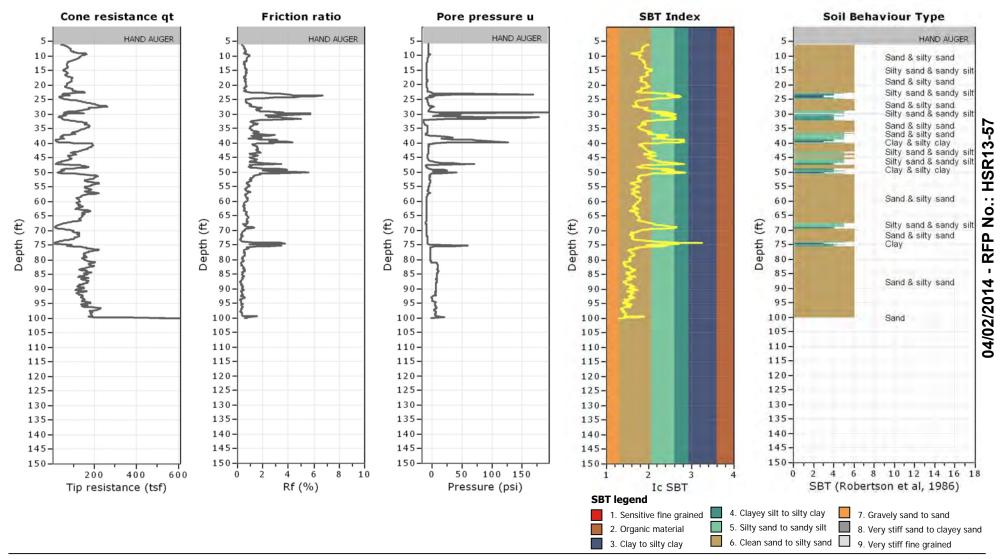
Location: Fresno-Bakersfield

CPT: S0050CPT

Total depth: 100.07 ft

Surface Elevation: 285.91 ft

Coords: X:6341333.44, Y:2114953.02





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**Project: California High-Speed Train** 

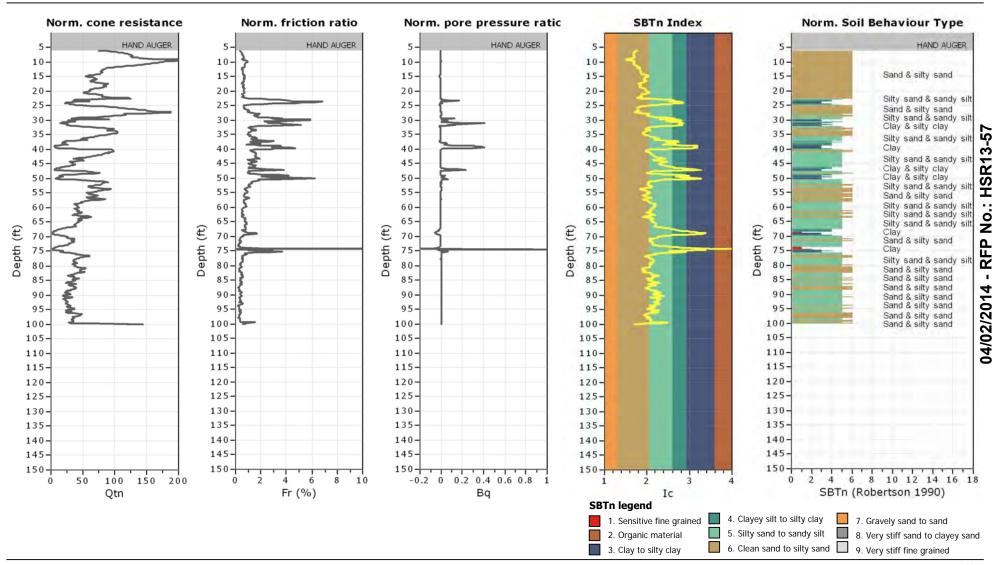
Location: Fresno-Bakersfield

CPT: S0050CPT

Total depth: 100.07 ft

Surface Elevation: 285.91 ft

Coords: X:6341333.44, Y:2114953.02



**Project: California High-Speed Train** 

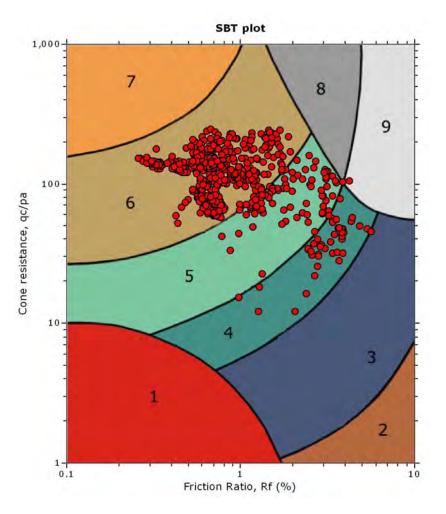
Location: Fresno-Bakersfield

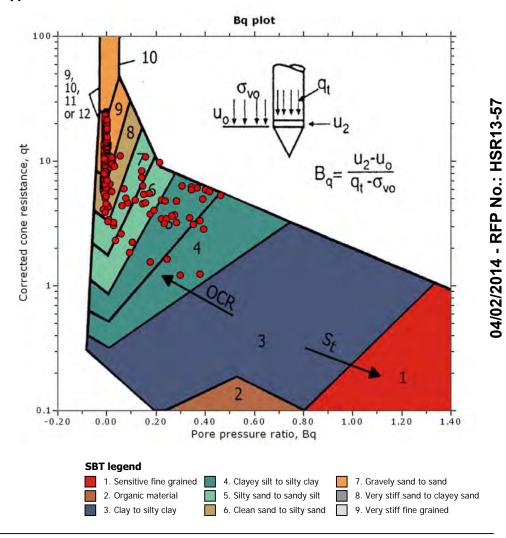
CPT: S0051CPT

Total depth: 100.23 ft Surface Elevation: 286.24 ft

Coords: X:6341797.49, Y:2114935.20

Cone Operator: Unknown





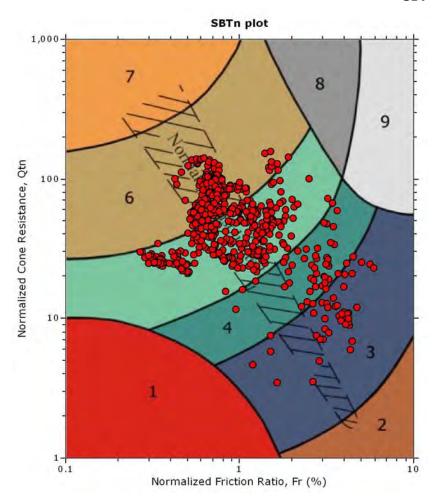
Cone Operator: Unknown

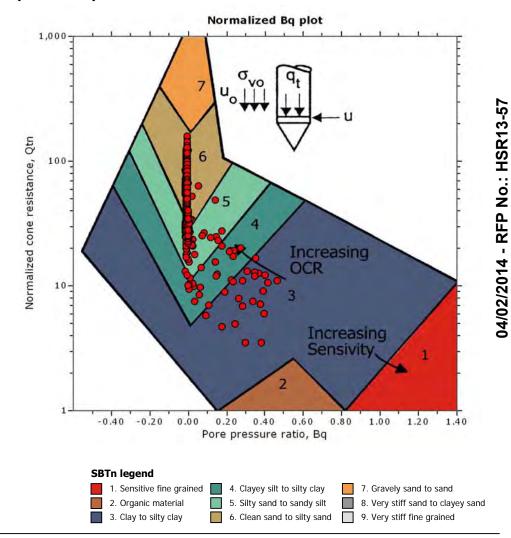
www.hsr.ca.gov

**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 100.23 ft Surface Elevation: 286.24 ft Coords: X:6341797.49, Y:2114935.20







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**Project: California High-Speed Train** 

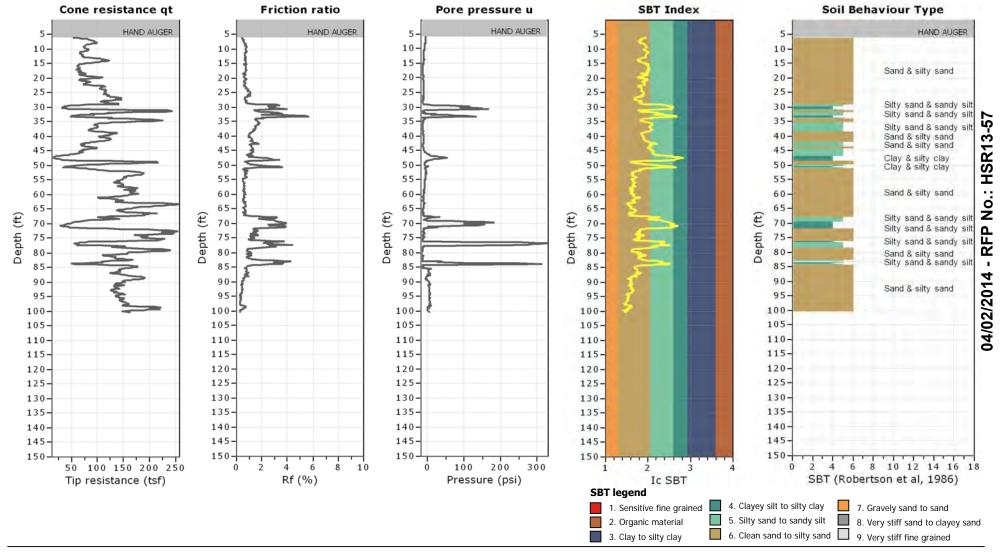
Location: Fresno-Bakersfield

CPT: S0051CPT

Total depth: 100.23 ft

Surface Elevation: 286.24 ft

Coords: X:6341797.49, Y:2114935.20





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**Project: California High-Speed Train** 

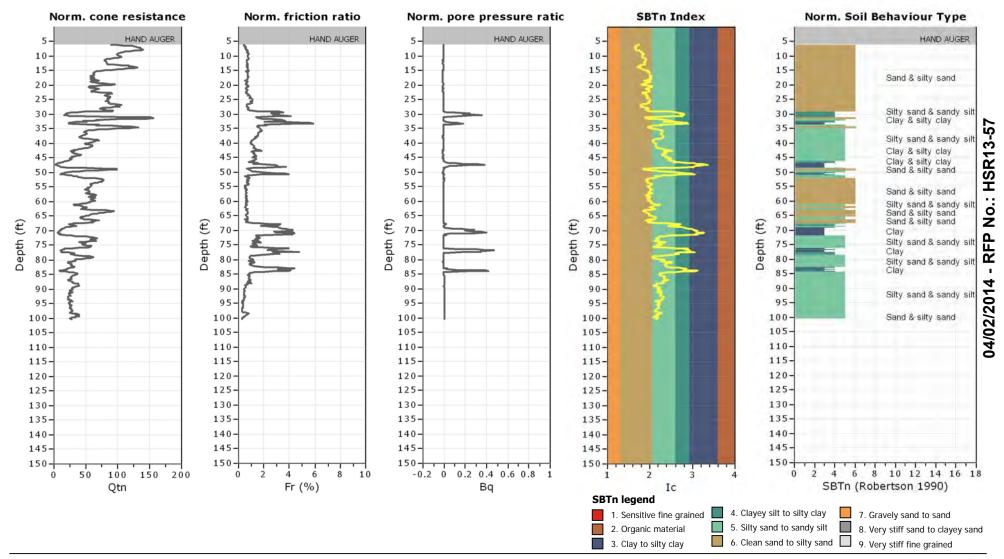
Location: Fresno-Bakersfield

CPT: S0051CPT

Total depth: 100.23 ft

Surface Elevation: 286.24 ft

Coords: X:6341797.49, Y:2114935.20



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

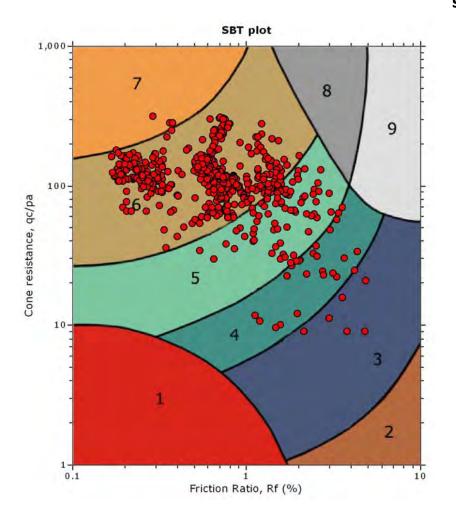
CPT: S0052CPT

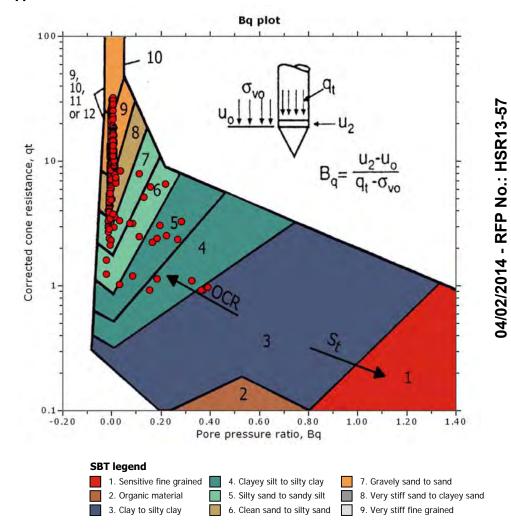
Total depth: 100.07 ft

Surface Elevation: 283.61 ft

Coords: X:6340158.41, Y:2113547.11

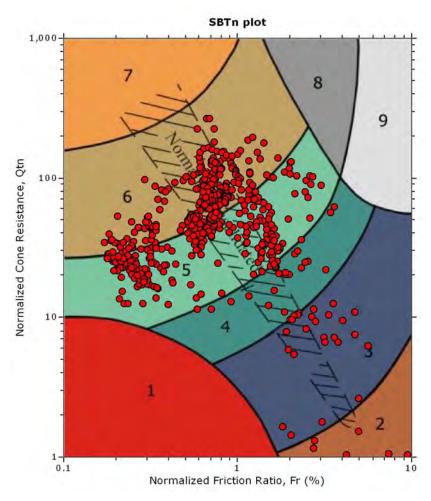
Cone Operator: Unknown

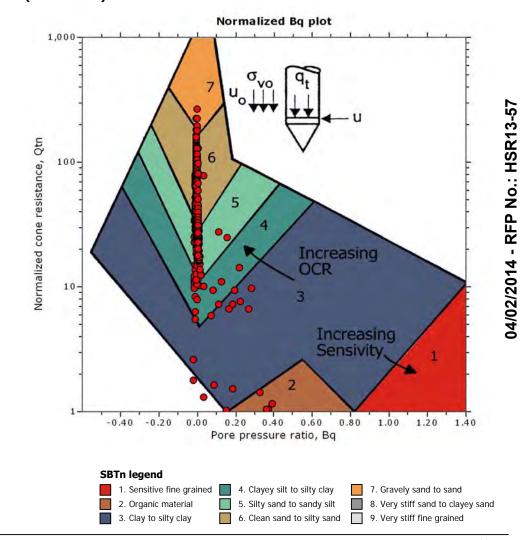




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







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**Project: California High-Speed Train** 

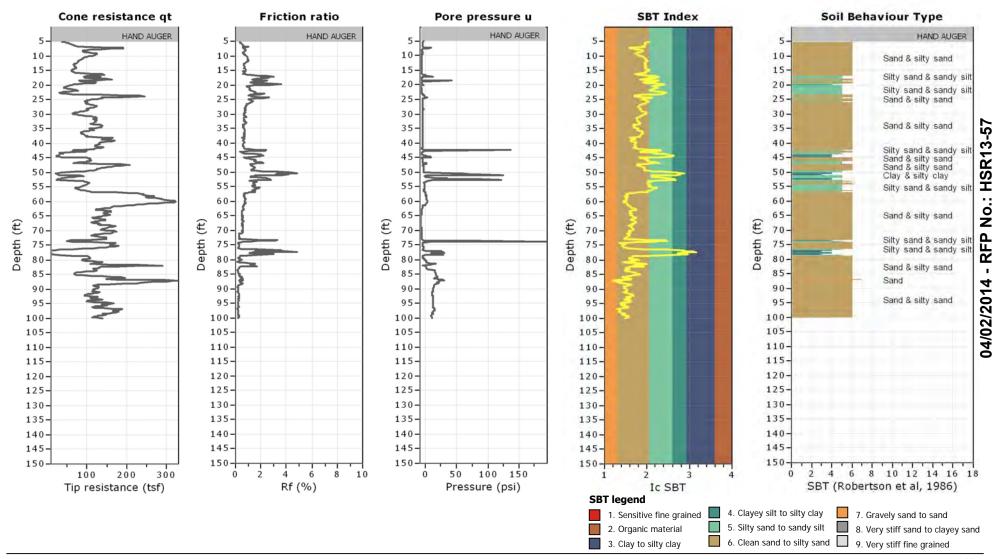
Location: Fresno-Bakersfield

CPT: S0052CPT

Total depth: 100.07 ft

Surface Elevation: 283.61 ft

Coords: X:6340158.41, Y:2113547.11





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**Project: California High-Speed Train** 

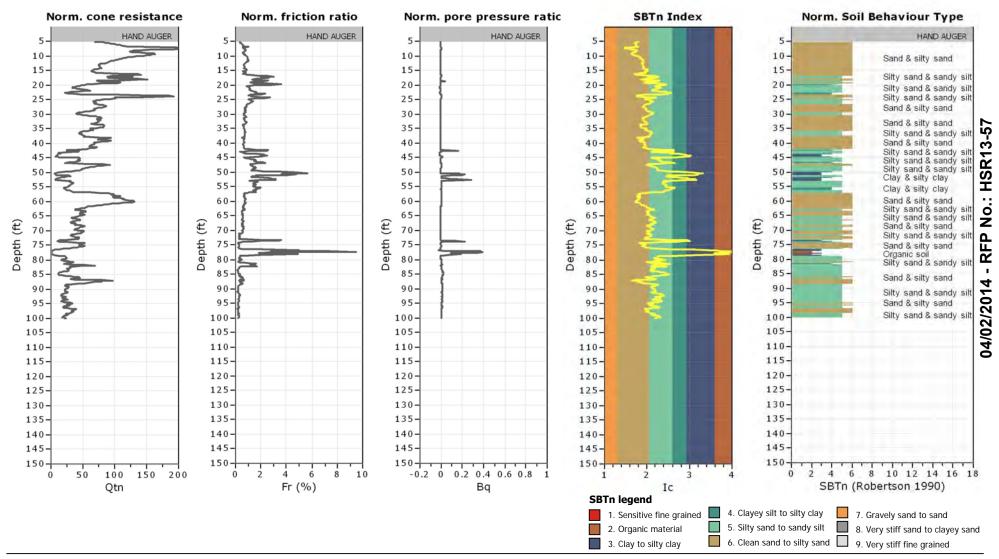
Location: Fresno-Bakersfield

CPT: S0052CPT

Total depth: 100.07 ft

Surface Elevation: 283.61 ft

Coords: X:6340158.41, Y:2113547.11



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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

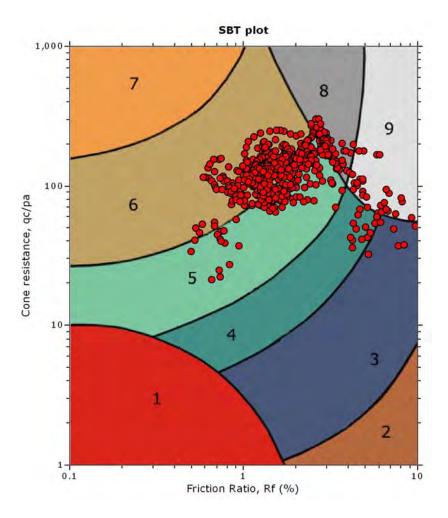
CPT: S0053CPT

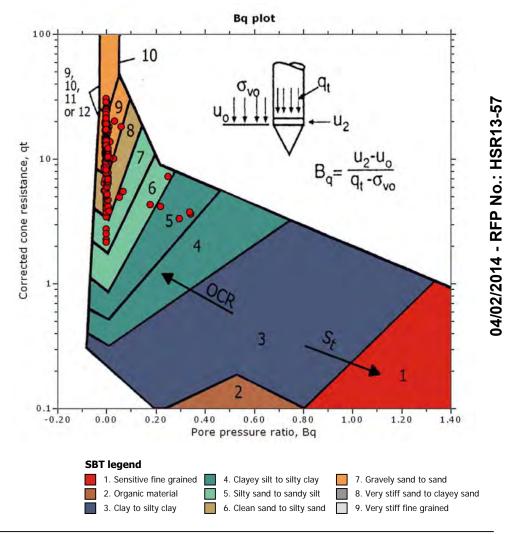
Total depth: 100.23 ft

Surface Elevation: 284.45 ft

Coords: X:6341436.68, Y:2112281.43

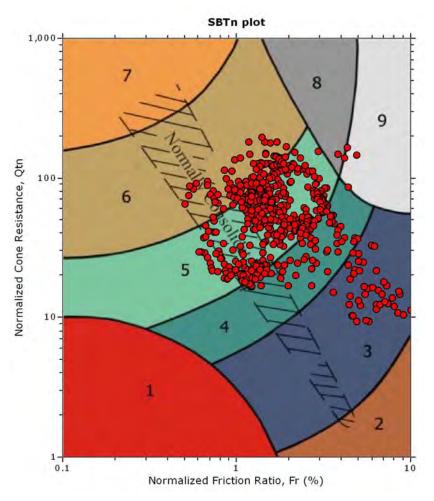
Cone Operator: Unknown

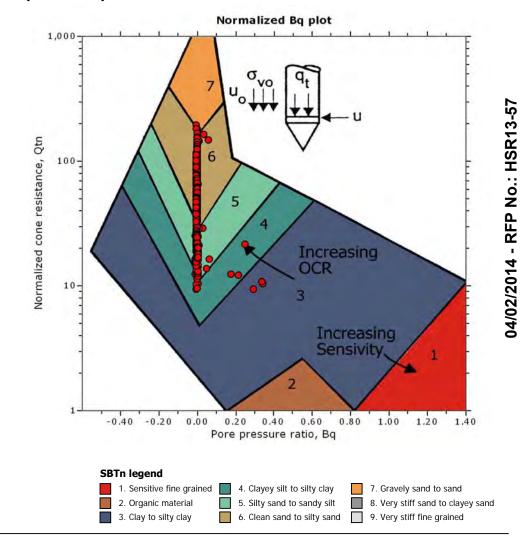




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

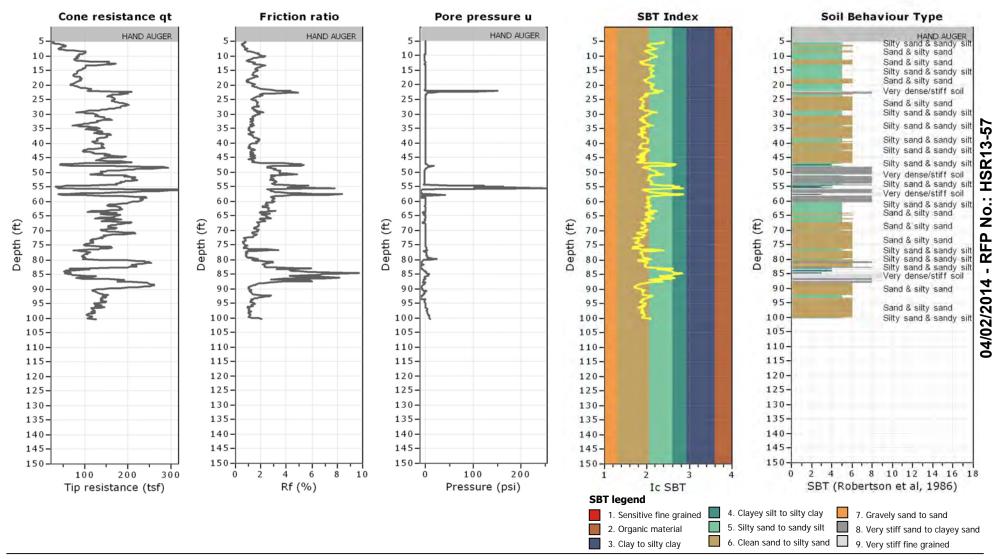
Location: Fresno-Bakersfield

CPT: S0053CPT

Total depth: 100.23 ft

Surface Elevation: 284.45 ft

Coords: X:6341436.68, Y:2112281.43





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**Project: California High-Speed Train** 

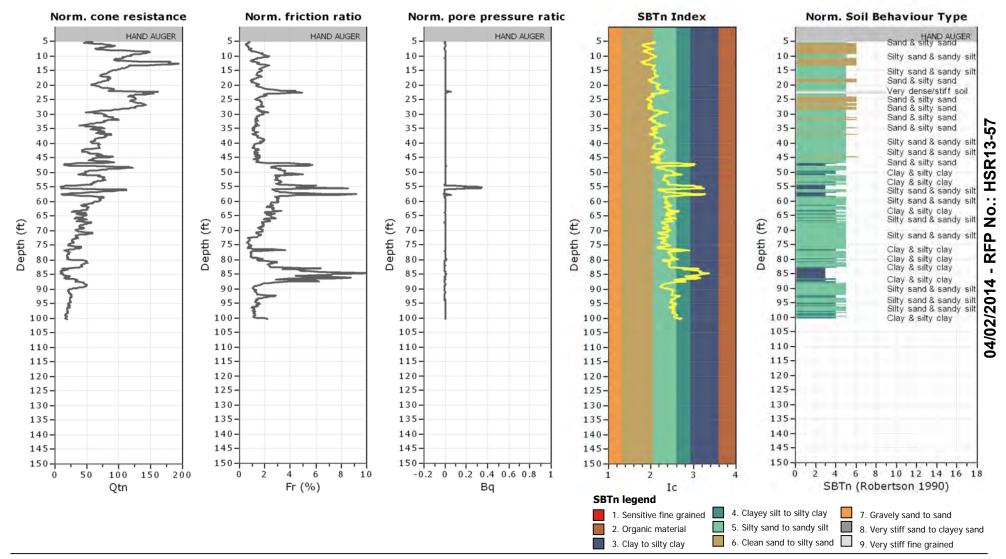
Location: Fresno-Bakersfield

CPT: S0053CPT

Total depth: 100.23 ft

Surface Elevation: 284.45 ft

Coords: X:6341436.68, Y:2112281.43



CPT: S0054CPT

Total depth: 100.23 ft Surface Elevation: 283.13 ft

Coords: X:6341278.60, Y:2109665.03

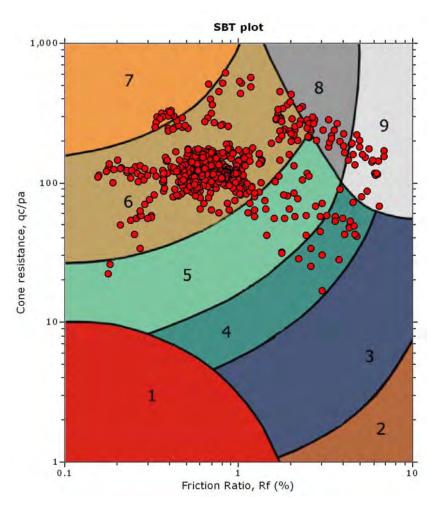
Cone Operator: Unknown

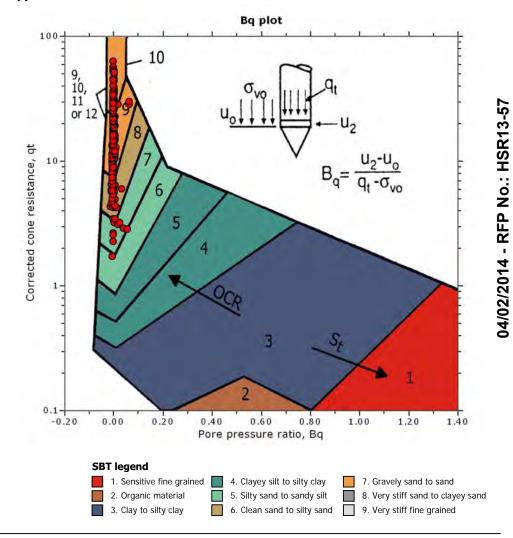
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

URS HMM ARUP

# SBT - Bq plots

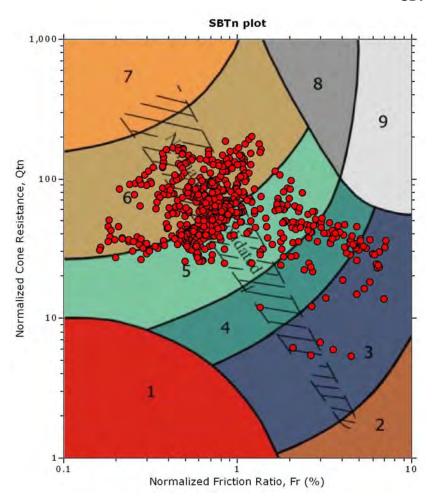


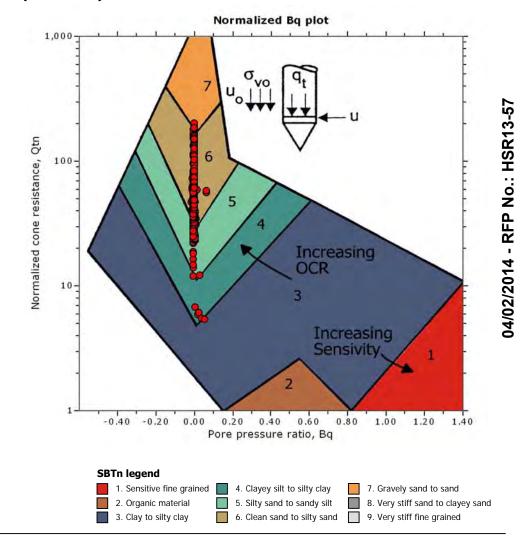




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

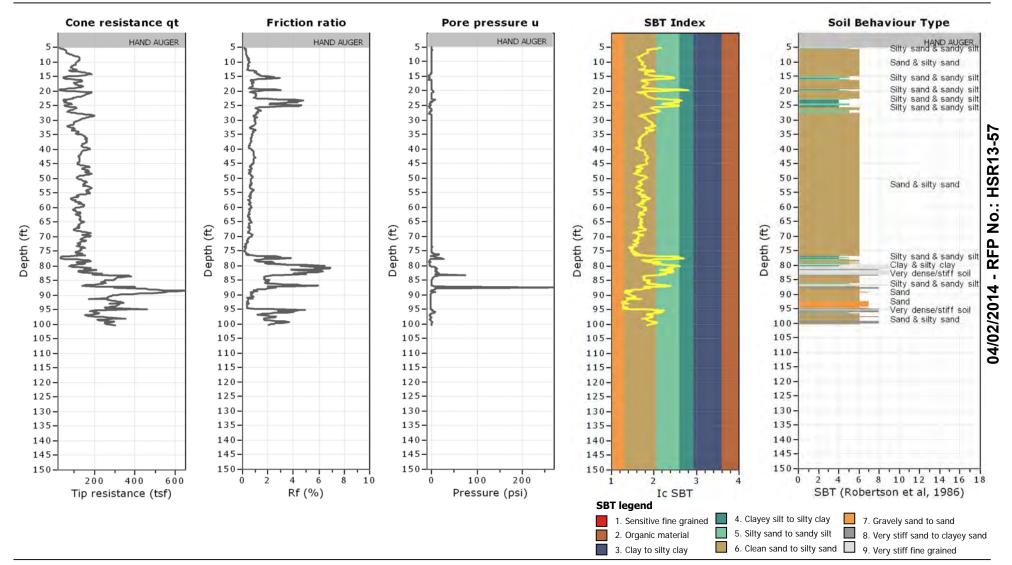
Location: Fresno-Bakersfield

CPT: S0054CPT

Total depth: 100.23 ft

Surface Elevation: 283.13 ft

Coords: X:6341278.60, Y:2109665.03





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**Project: California High-Speed Train** 

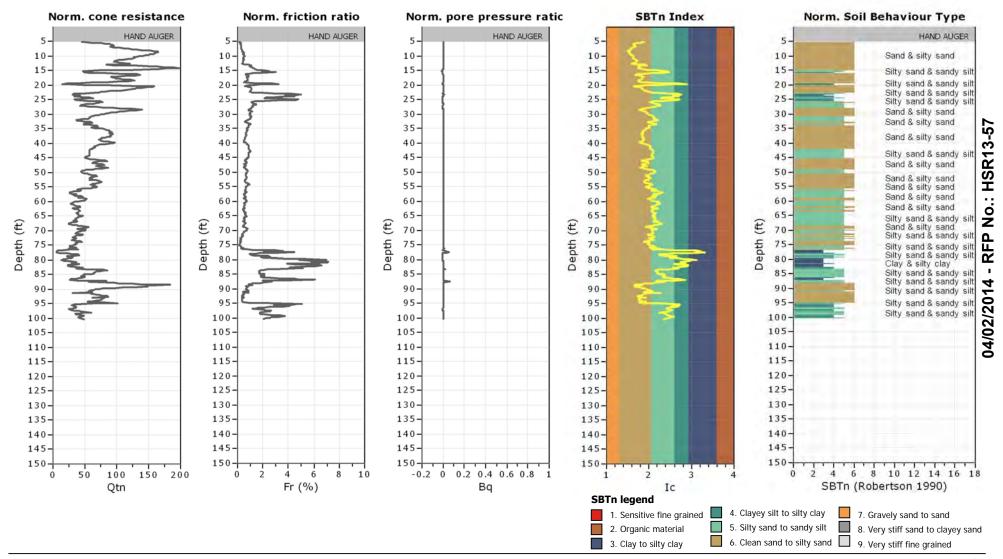
Location: Fresno-Bakersfield

CPT: S0054CPT

Total depth: 100.23 ft

Surface Elevation: 283.13 ft

Coords: X:6341278.60, Y:2109665.03

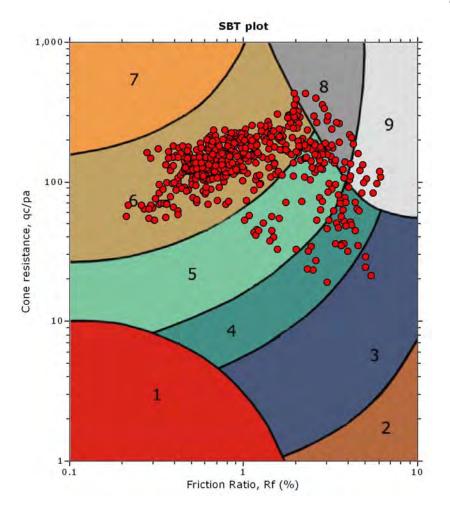


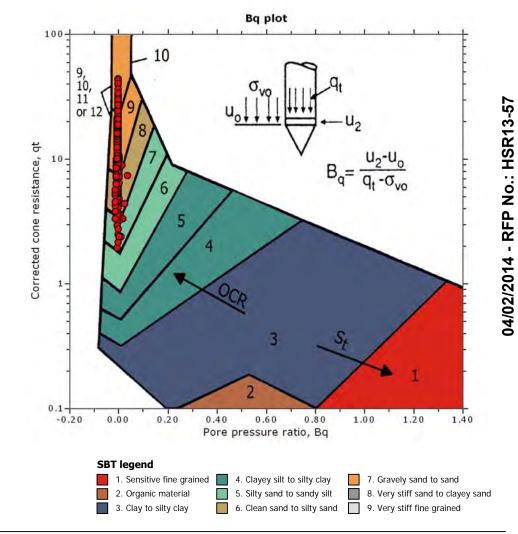
**Project: California High-Speed Train** 

URS HMM ARUP

Location: Fresno-Bakersfield

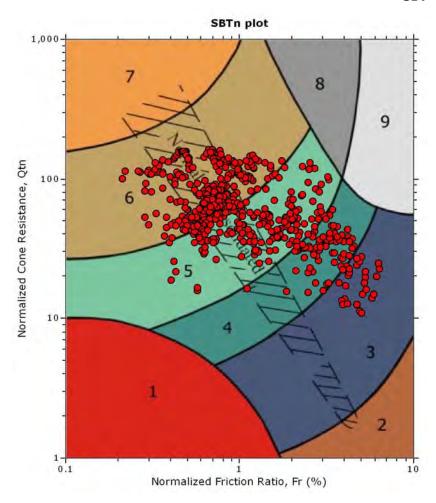
# SBT - Bq plots

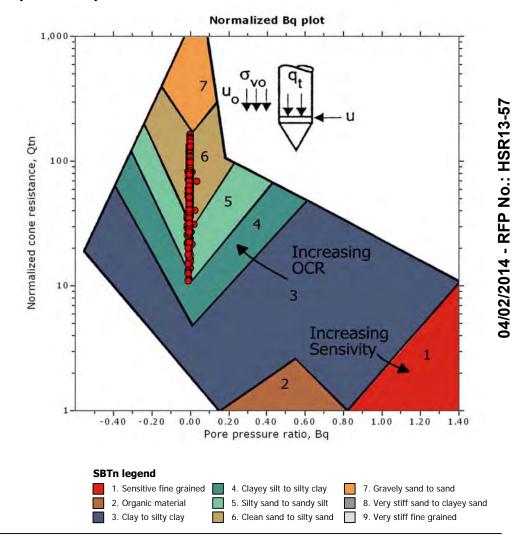




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







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**Project: California High-Speed Train** 

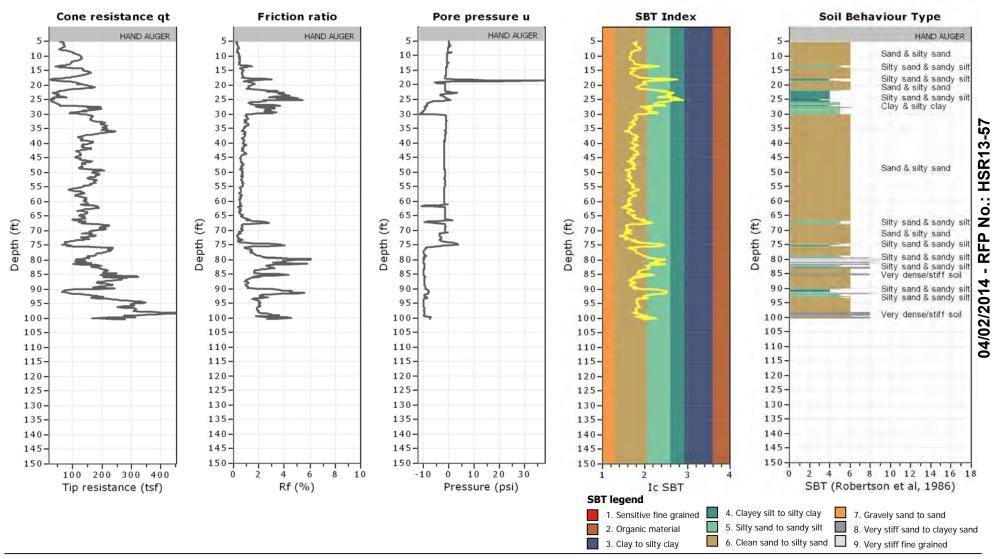
Location: Fresno-Bakersfield

CPT: S0055CPT

Total depth: 100.39 ft

Surface Elevation: 283.41 ft

Coords: X:6341752.86, Y:2109666.42





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**Project: California High-Speed Train** 

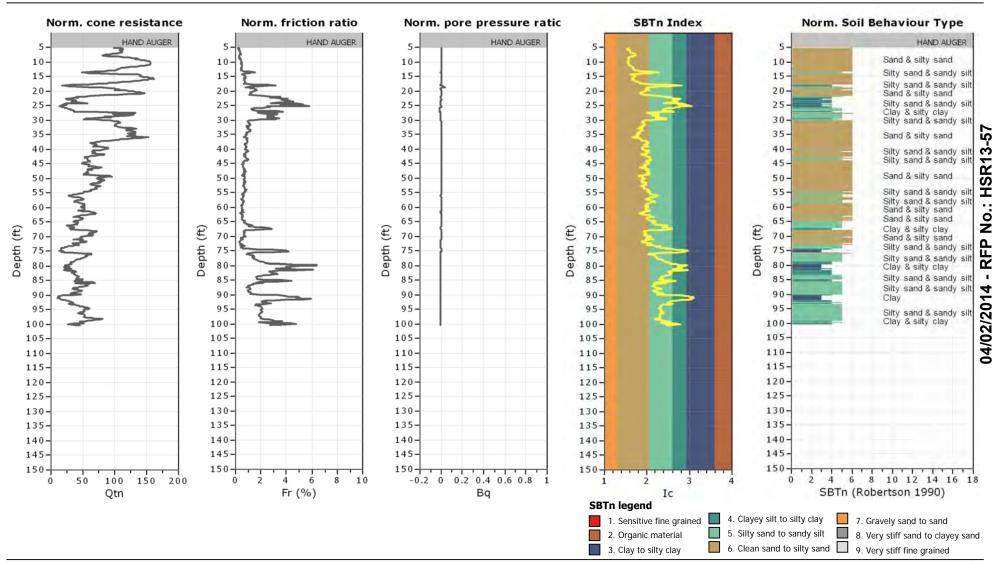
Location: Fresno-Bakersfield

CPT: S0055CPT

Total depth: 100.39 ft

Surface Elevation: 283.41 ft

Coords: X:6341752.86, Y:2109666.42



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0056CPT

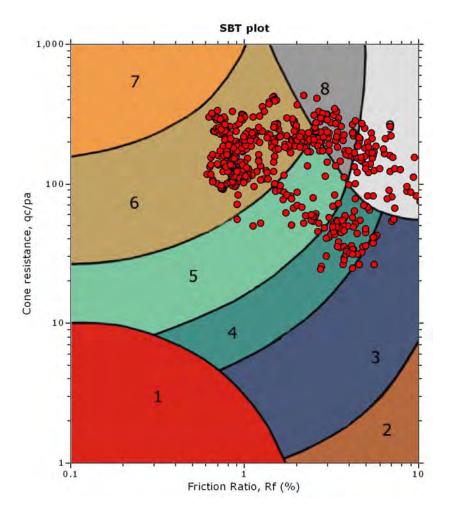
Total depth: 100.23 ft

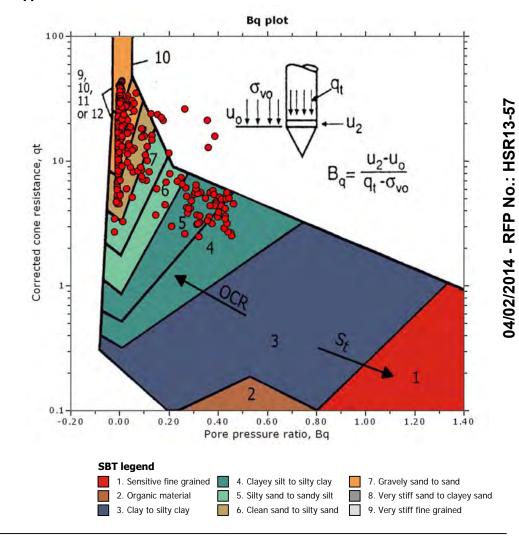
Surface Elevation: 279.00 ft

Coords: X:6340154.10, Y:2108368.67

Cone Operator: Unknown

# SBT - Bq plots





Surface Elevation: 279.00 ft

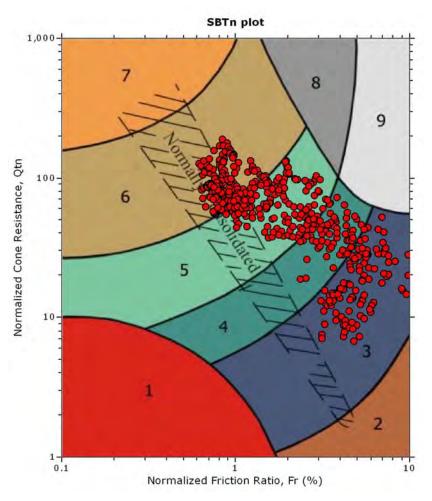


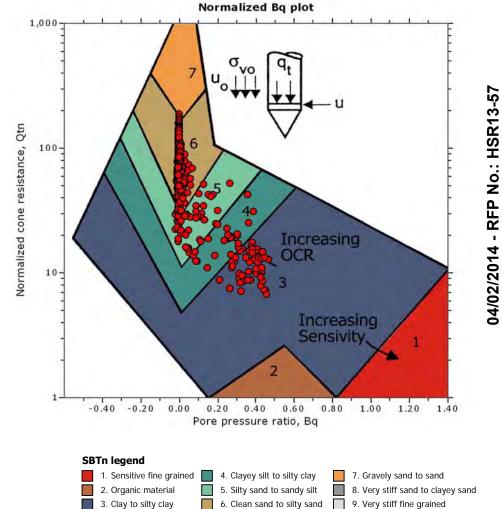
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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

Train Train







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**Project: California High-Speed Train** 

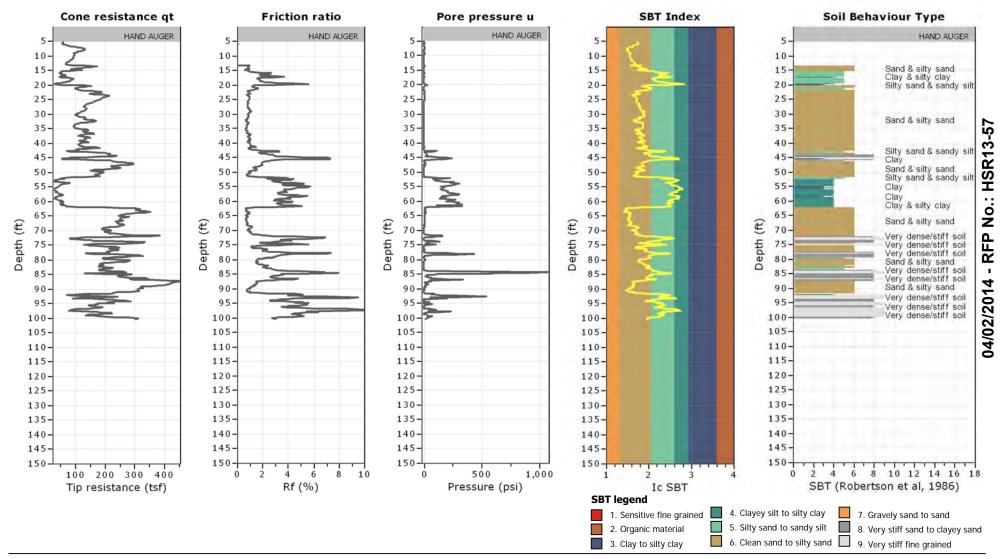
Location: Fresno-Bakersfield

CPT: S0056CPT

Total depth: 100.23 ft

Surface Elevation: 279.00 ft

Coords: X:6340154.10, Y:2108368.67





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**Project: California High-Speed Train** 

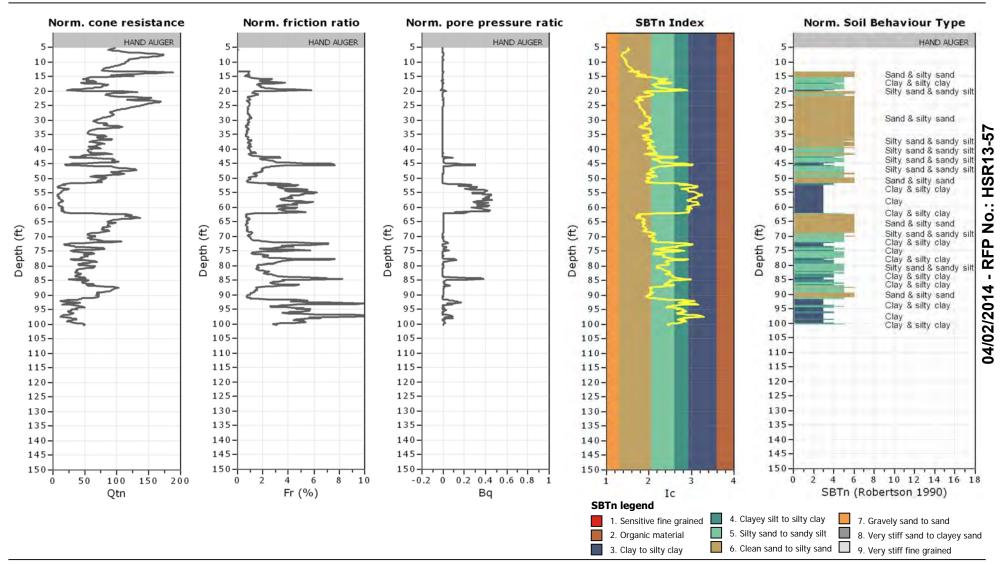
Location: Fresno-Bakersfield

CPT: S0056CPT

Total depth: 100.23 ft

Surface Elevation: 279.00 ft

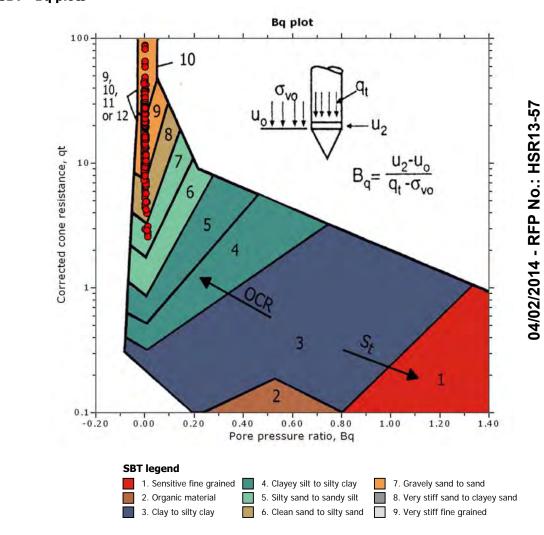
Coords: X:6340154.10, Y:2108368.67

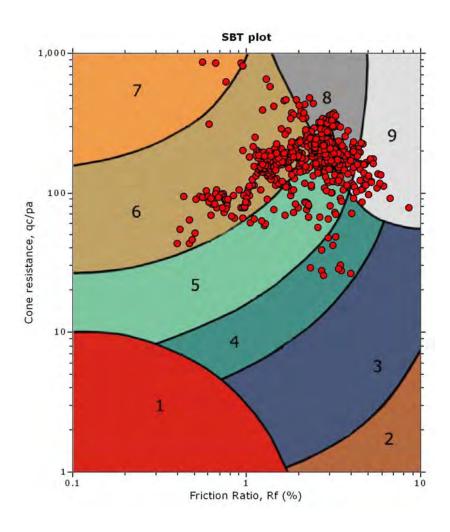


**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

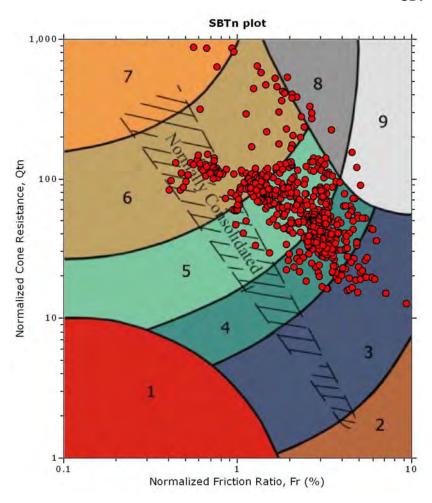
# SBT - Bq plots

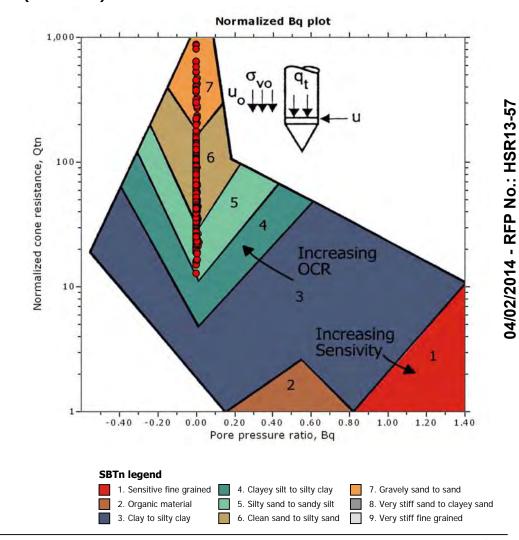




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

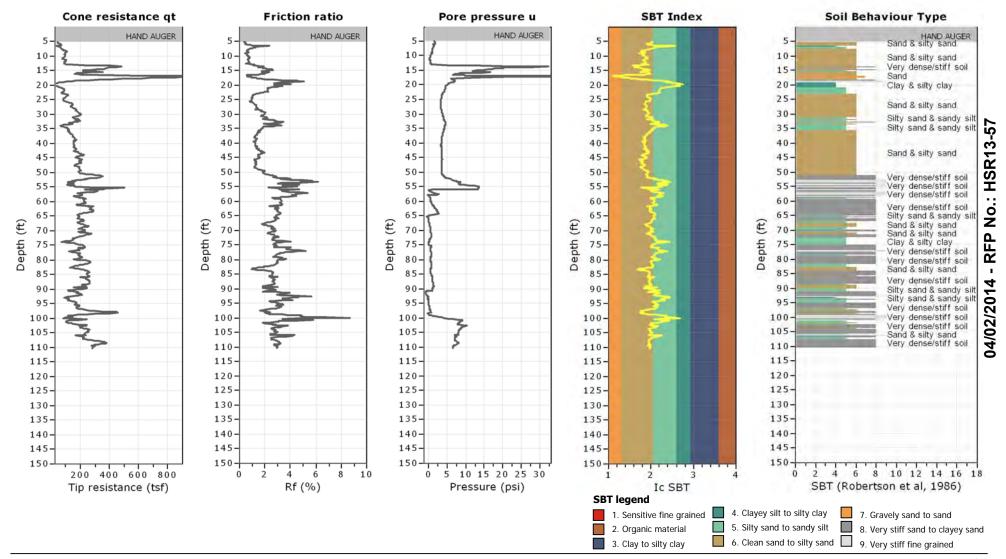
Location: Fresno-Bakersfield

CPT: S0059CPT

Total depth: 110.24 ft

Surface Elevation: 276.81 ft

Coords: X:6340121.26, Y:2104152.70





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**Project: California High-Speed Train** 

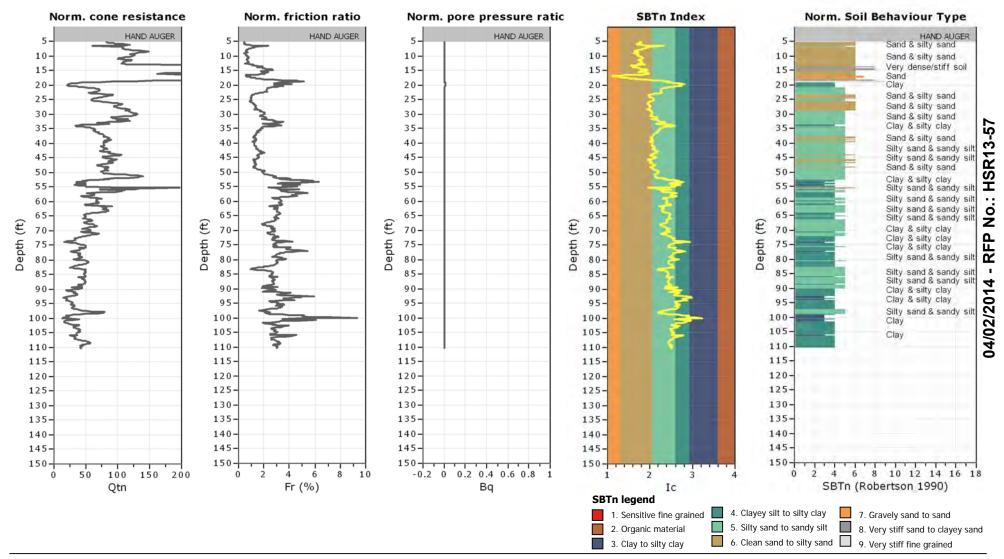
Location: Fresno-Bakersfield

CPT: S0059CPT

Total depth: 110.24 ft

Surface Elevation: 276.81 ft Coords: X:6340121.26. Y:2104152.70

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

### CPT: S0060CPT

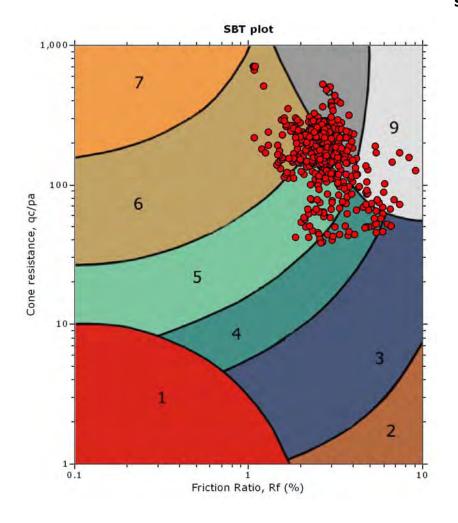
Total depth: 99.90 ft

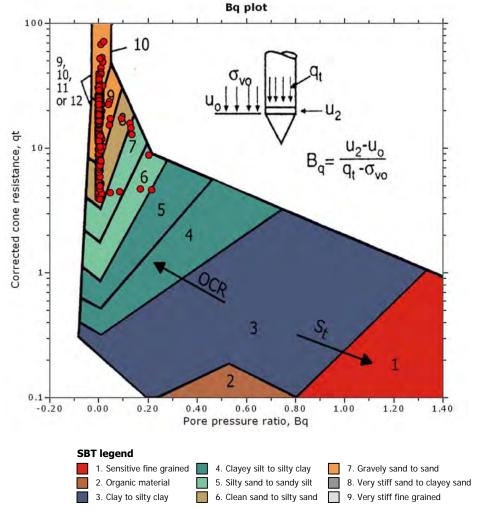
Surface Elevation: 278.44 ft

Coords: X:6341930.39, Y:2104318.02

Cone Operator: Unknown

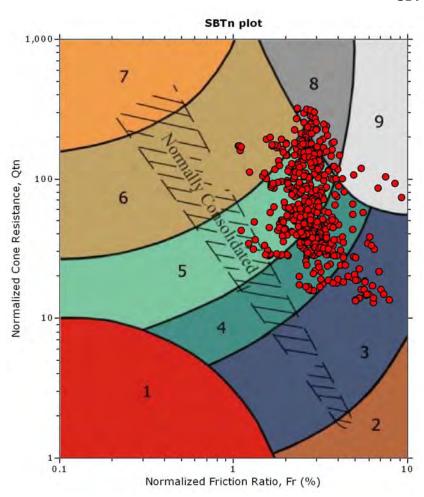
# SBT - Bq plots

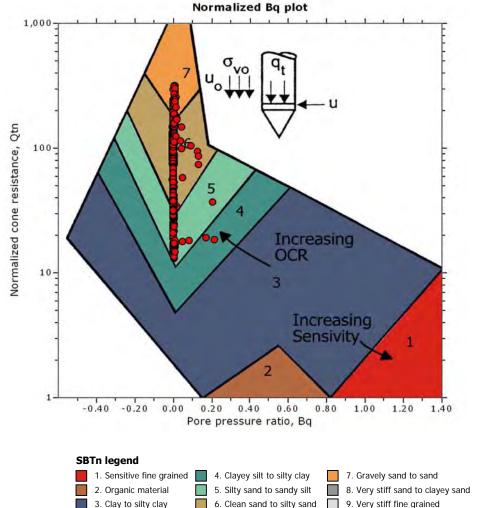




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

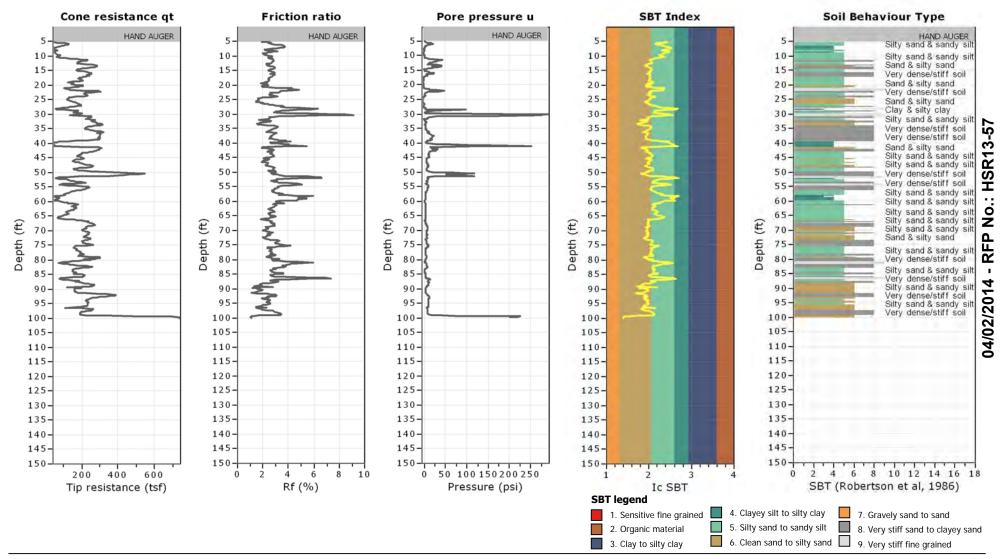
Location: Fresno-Bakersfield

CPT: S0060CPT

Total depth: 99.90 ft

Surface Elevation: 278.44 ft

Coords: X:6341930.39, Y:2104318.02





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**Project: California High-Speed Train** 

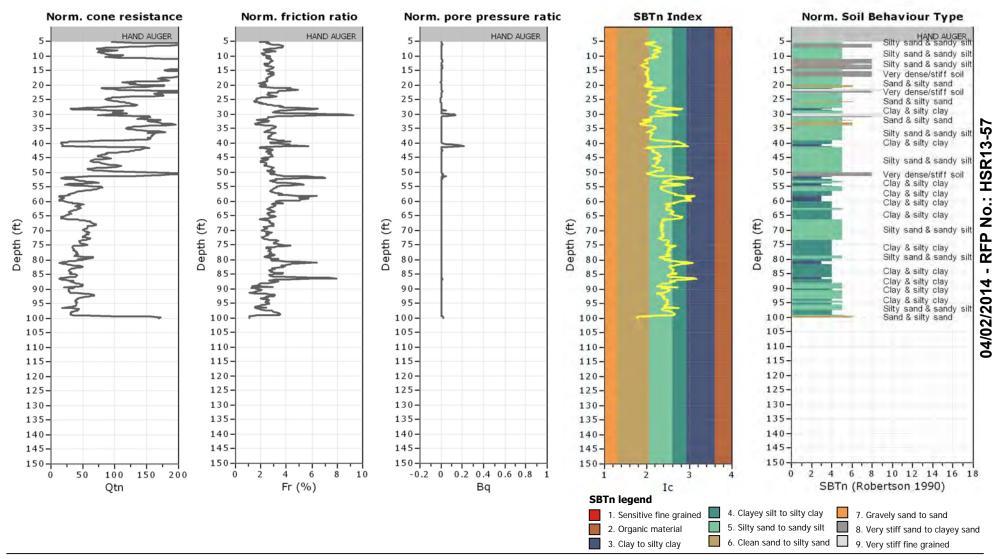
Location: Fresno-Bakersfield

CPT: S0060CPT

Total depth: 99.90 ft

Surface Elevation: 278.44 ft

Coords: X:6341930.39, Y:2104318.02



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0062CPT

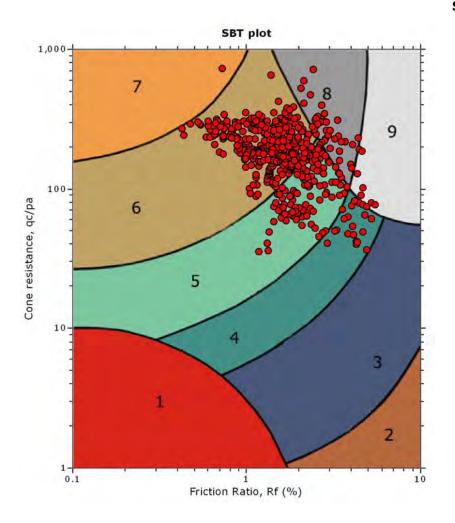
Total depth: 100.23 ft

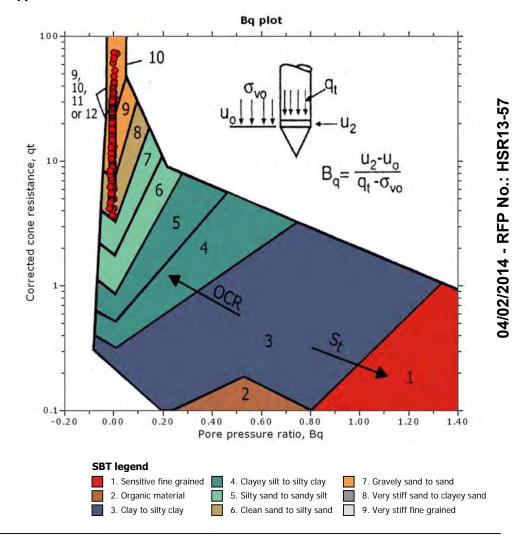
Surface Elevation: 276.42 ft

Coords: X:6341339.61, Y:2101814.23

Cone Operator: Unknown

# SBT - Bq plots



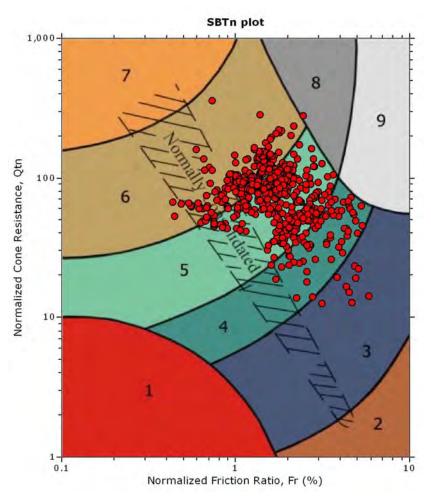


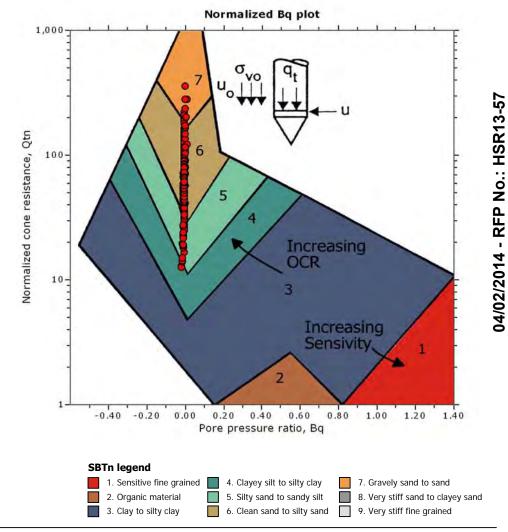
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

Total depth: 100.23 ft Surface Elevation: 276.42 ft Coords: X:6341339.61, Y:2101814.23

Cone Operator: Unknown







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**Project: California High-Speed Train** 

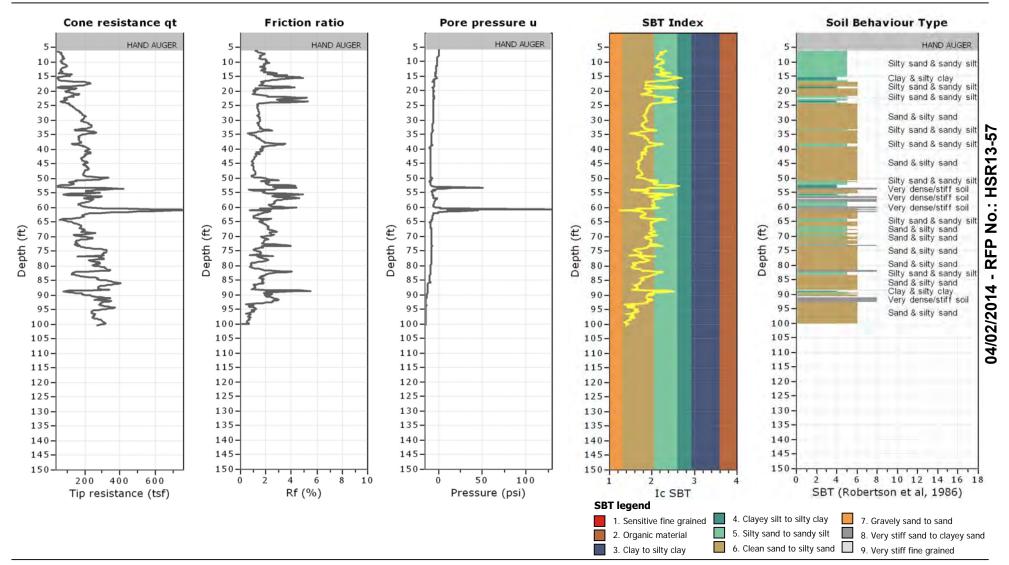
Location: Fresno-Bakersfield

CPT: S0062CPT

Total depth: 100.23 ft

Surface Elevation: 276.42 ft

Coords: X:6341339.61, Y:2101814.23





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**Project: California High-Speed Train** 

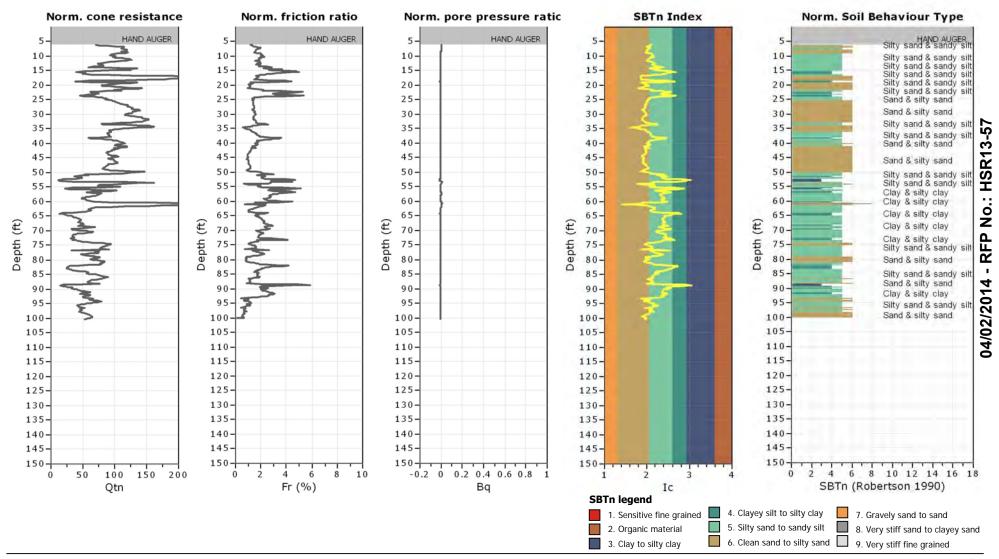
Location: Fresno-Bakersfield

CPT: S0062CPT

Total depth: 100.23 ft

Surface Elevation: 276.42 ft

Coords: X:6341339.61, Y:2101814.23



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0063CPT

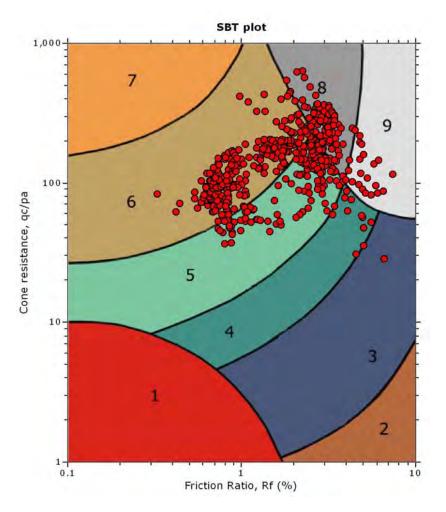
Total depth: 100.56 ft

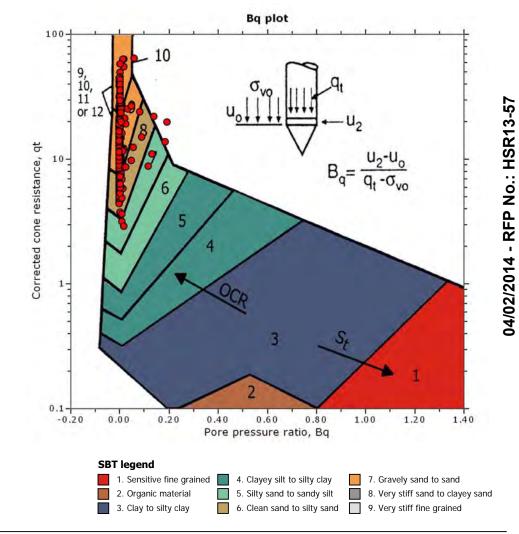
Surface Elevation: 276.65 ft

Coords: X:6341732.48, Y:2101712.86

Cone Operator: Unknown

# SBT - Bq plots





Cone Operator: Unknown

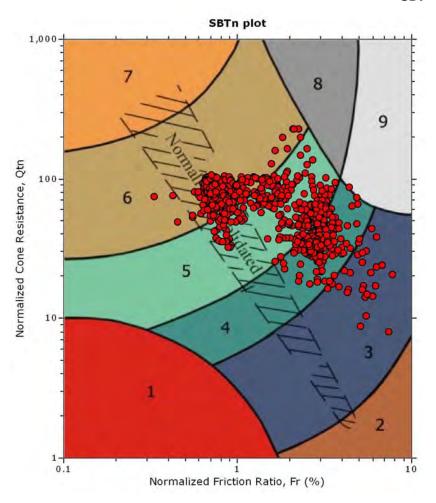


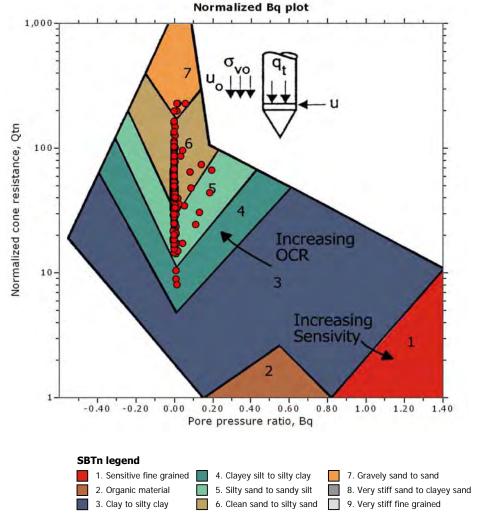
www.hsr.ca.gov

**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 100.56 ft Surface Elevation: 276.65 ft Coords: X:6341732.48, Y:2101712.86







www.hsr.ca.gov

**Project: California High-Speed Train** 

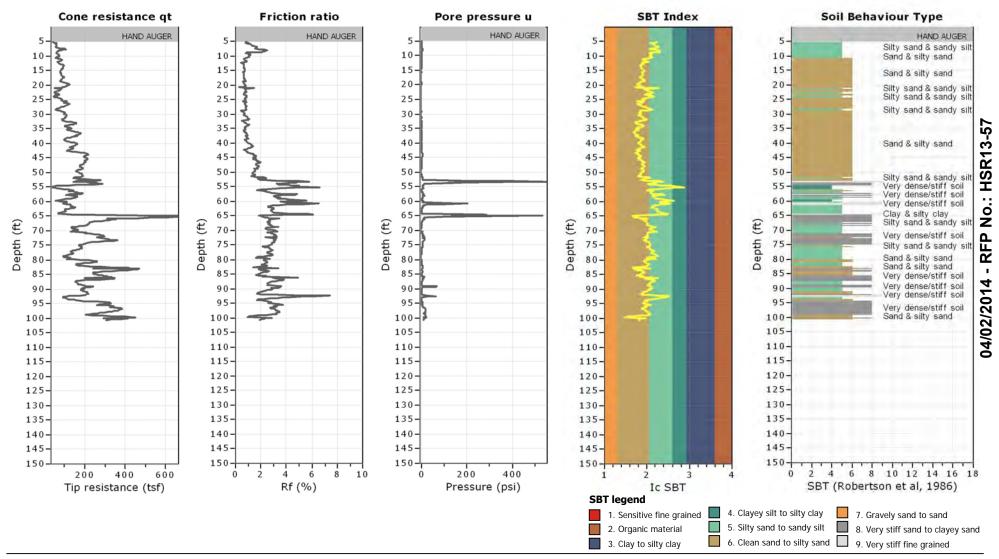
Location: Fresno-Bakersfield

CPT: S0063CPT

Total depth: 100.56 ft

Surface Elevation: 276.65 ft

Coords: X:6341732.48, Y:2101712.86





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**Project: California High-Speed Train** 

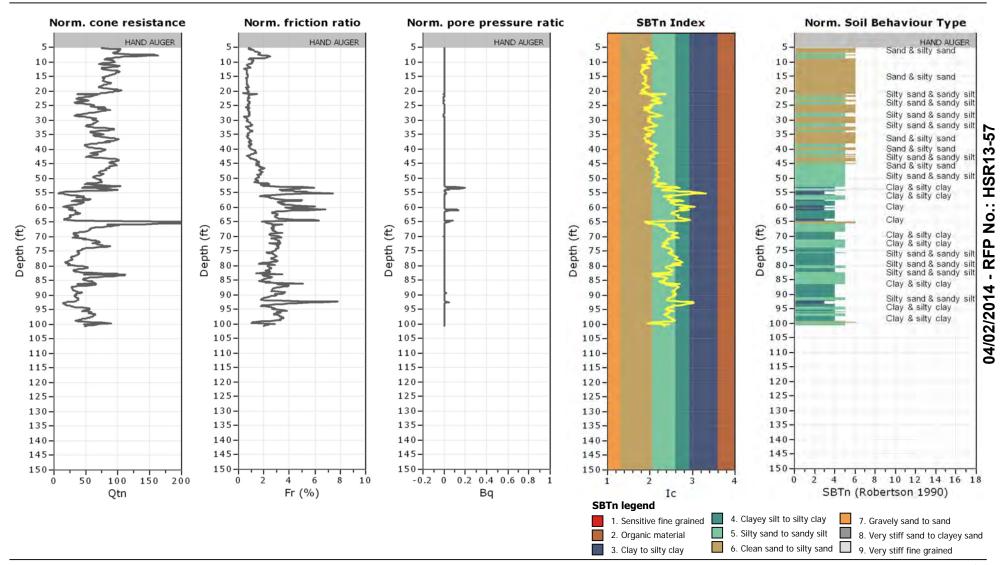
Location: Fresno-Bakersfield

CPT: S0063CPT

Total depth: 100.56 ft

Surface Elevation: 276.65 ft

Coords: X:6341732.48, Y:2101712.86



CPT: S0065CPT

Total depth: 100.56 ft Surface Elevation: 276.64 ft

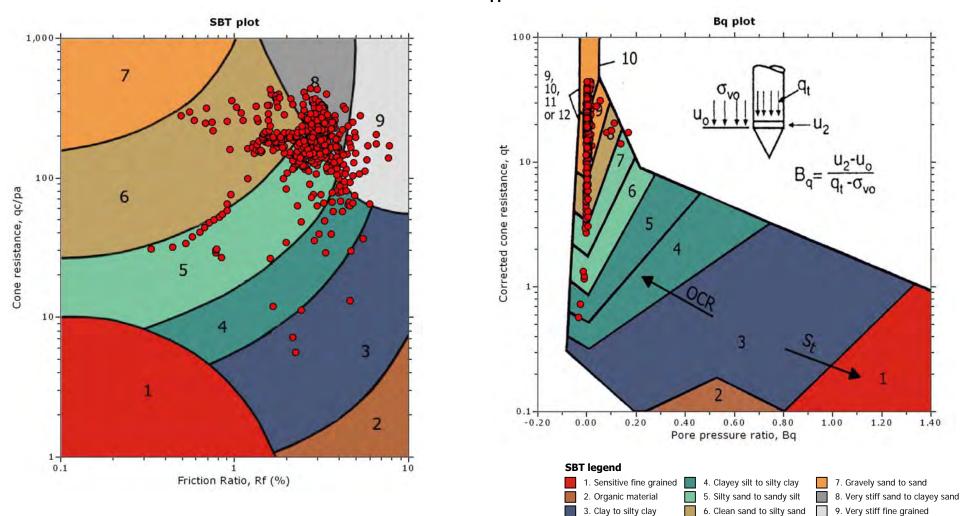
Coords: X:6341983.77, Y:2099077.26

Cone Operator: Unknown

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

SBT - Bq plots

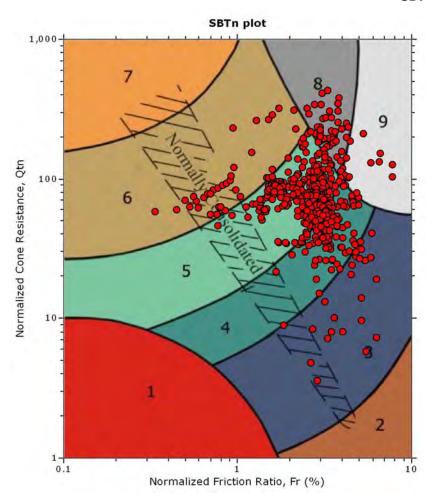


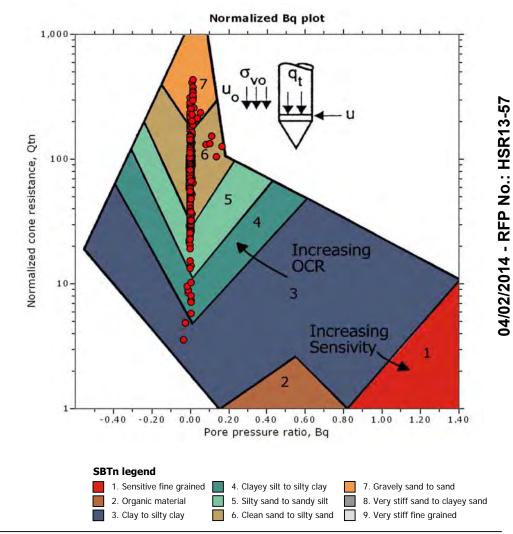
1.40

1.20

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

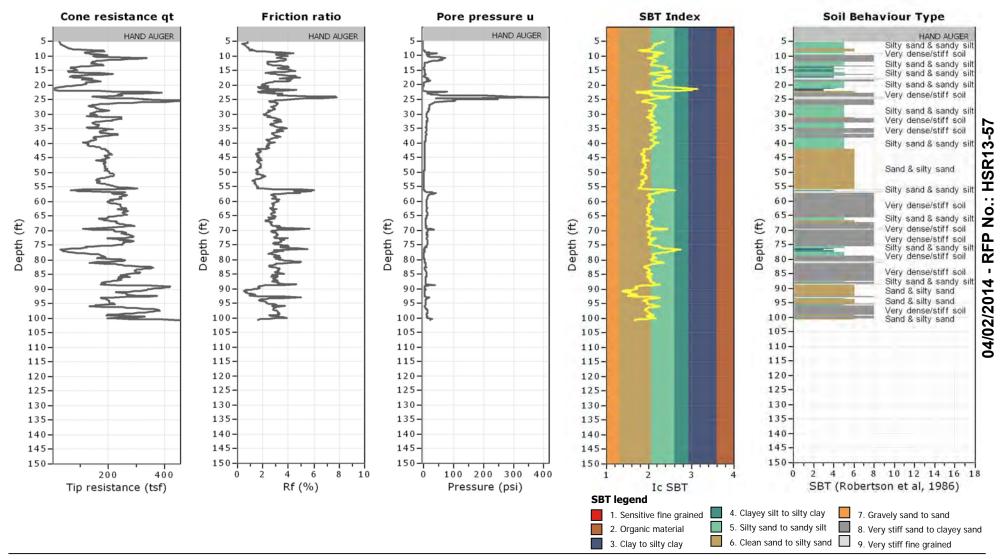
Location: Fresno-Bakersfield

CPT: S0065CPT

Total depth: 100.56 ft

Surface Elevation: 276.64 ft

Coords: X:6341983.77, Y:2099077.26





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**Project: California High-Speed Train** 

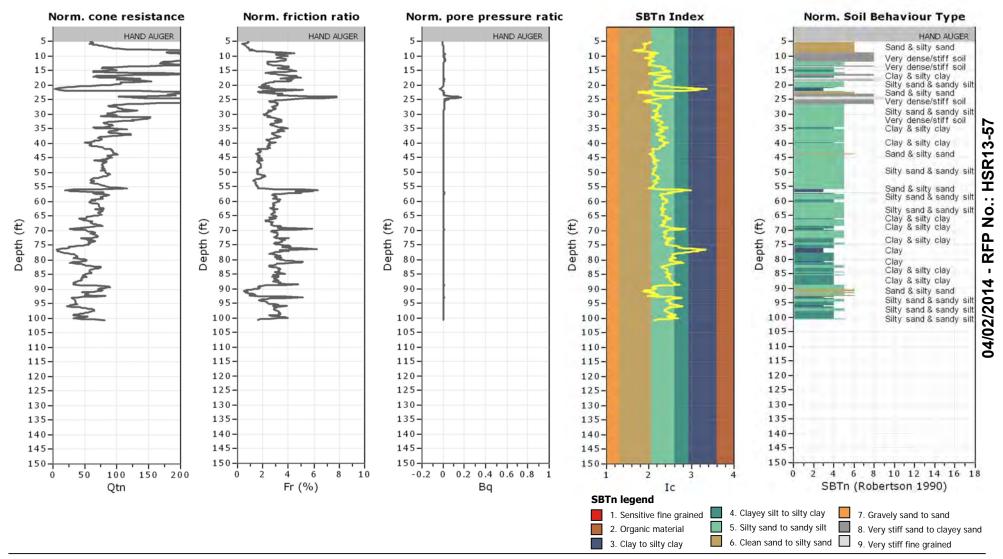
Location: Fresno-Bakersfield

CPT: S0065CPT

Total depth: 100.56 ft

Surface Elevation: 276.64 ft

Coords: X:6341983.77, Y:2099077.26



SBT plot

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

1,000

100-

0.1

Cone resistance, qc/pa

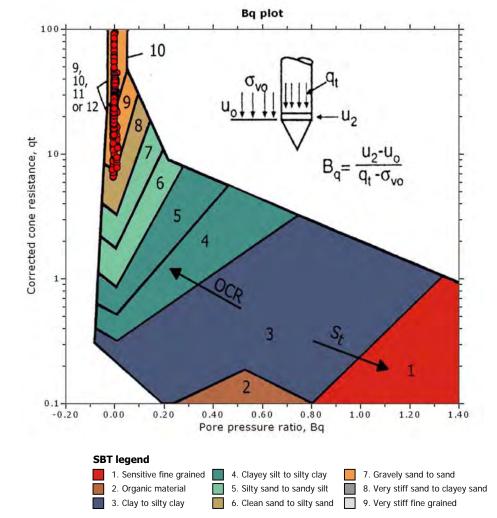
CPT: S0068CPT

Total depth: 99.74 ft

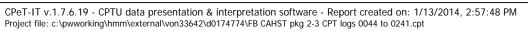
Surface Elevation: 277.02 ft

Coords: X:6343992.25, Y:2093802.07

Cone Operator: Unknown







Friction Ratio, Rf (%)

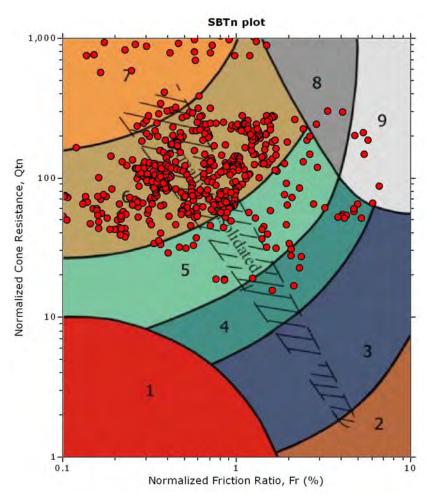
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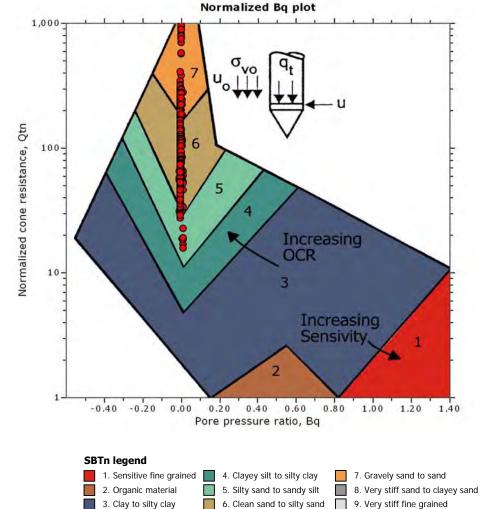
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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

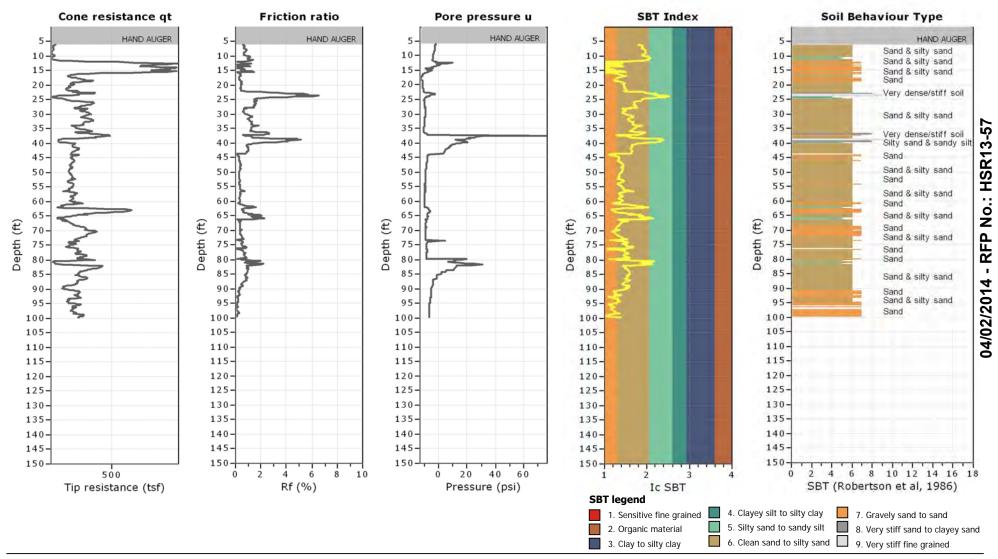
Location: Fresno-Bakersfield

CPT: S0068CPT

Total depth: 99.74 ft

Surface Elevation: 277.02 ft

Coords: X:6343992.25, Y:2093802.07





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**Project: California High-Speed Train** 

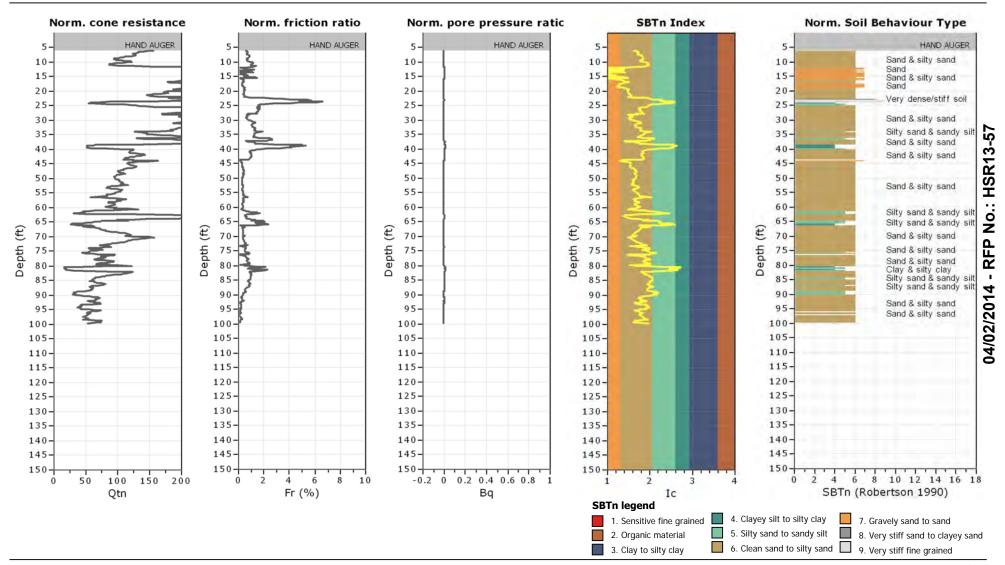
Location: Fresno-Bakersfield

CPT: S0068CPT

Total depth: 99.74 ft

Surface Elevation: 277.02 ft

Coords: X:6343992.25, Y:2093802.07



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0071CPT

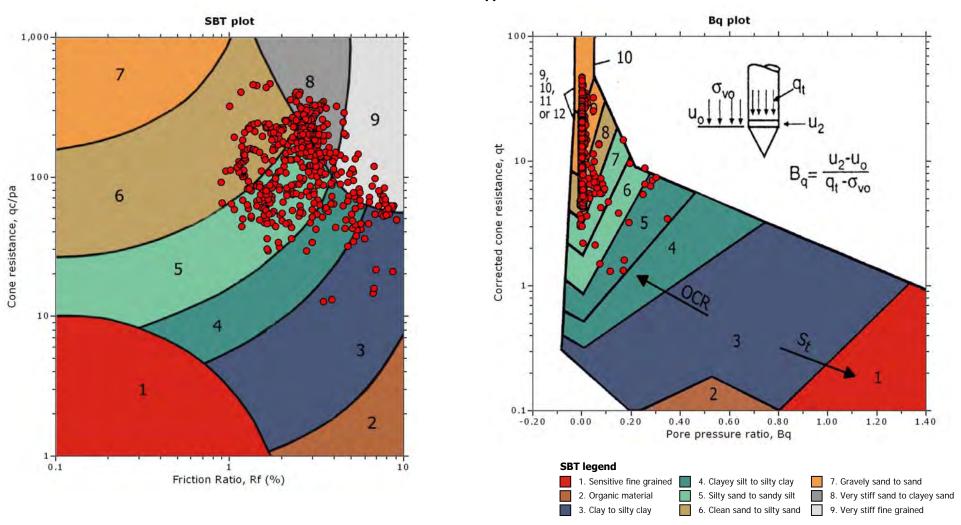
Total depth: 90.22 ft

Surface Elevation: 275.05 ft

Coords: X:6343463.78, Y:2091194.00

Cone Operator: Unknown

# SBT - Bq plots

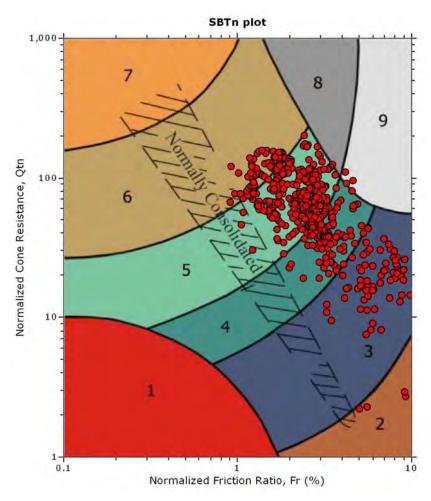


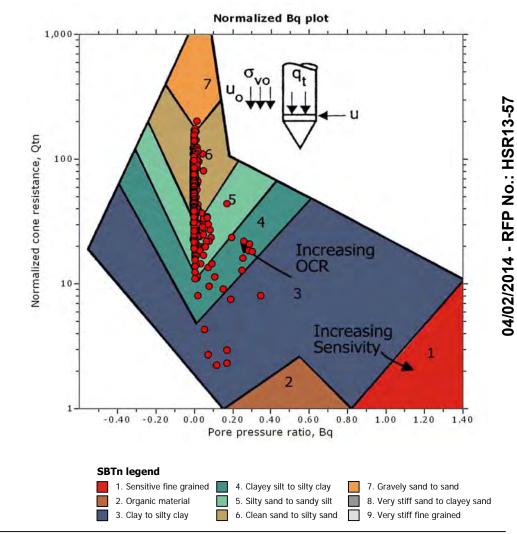
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 90.22 ft Surface Elevation: 275.05 ft Coords: X:6343463.78, Y:2091194.00

Cone Operator: Unknown







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**Project: California High-Speed Train** 

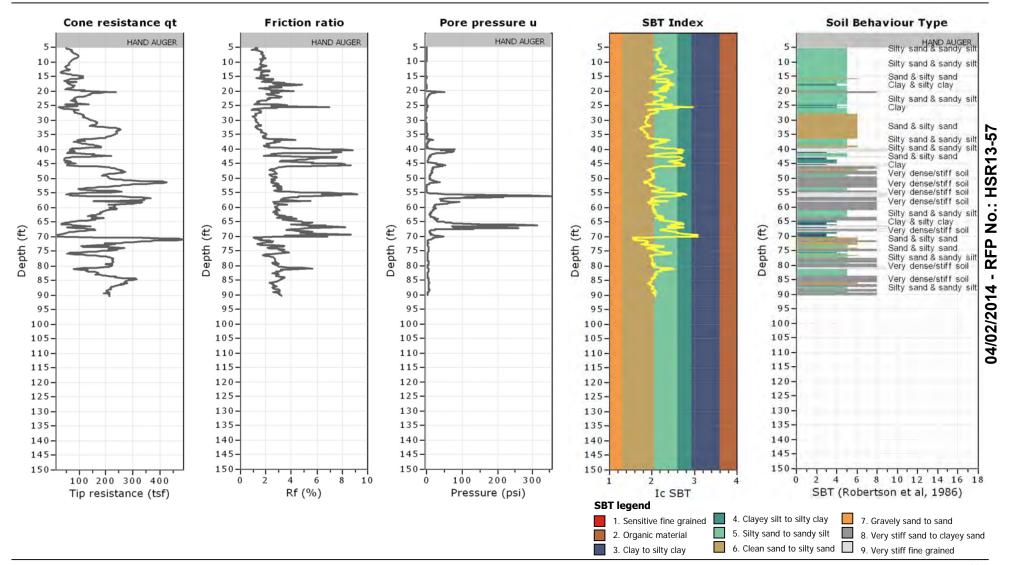
Location: Fresno-Bakersfield

CPT: S0071CPT

Total depth: 90.22 ft

Surface Elevation: 275.05 ft

Coords: X:6343463.78, Y:2091194.00





www.hsr.ca.gov

**Project: California High-Speed Train** 

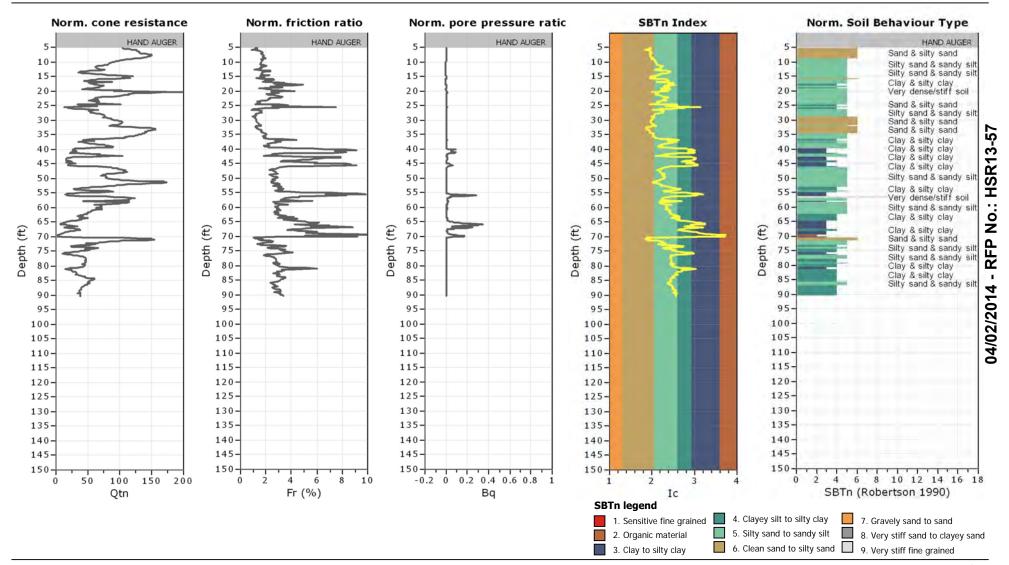
Location: Fresno-Bakersfield

CPT: S0071CPT

Total depth: 90.22 ft

Surface Elevation: 275.05 ft

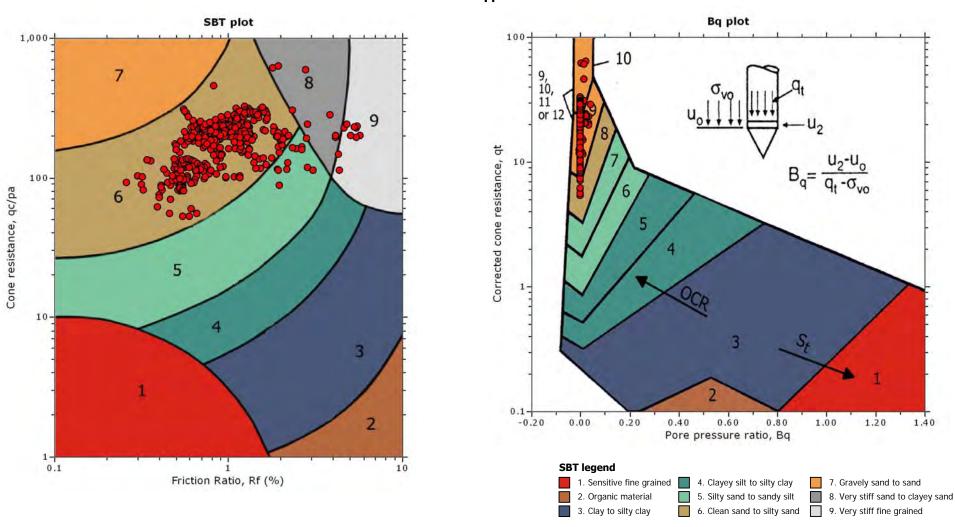
Coords: X:6343463.78, Y:2091194.00



**Project: California High-Speed Train** 

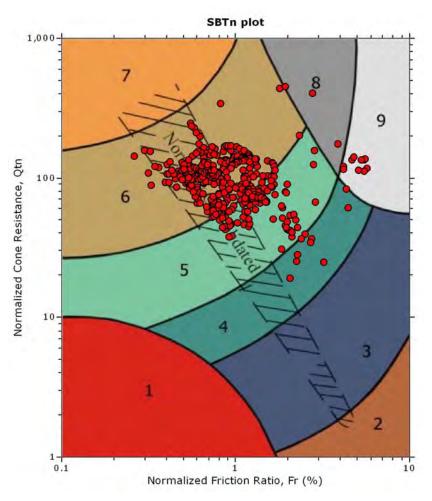
**Location: Fresno-Bakersfield** 

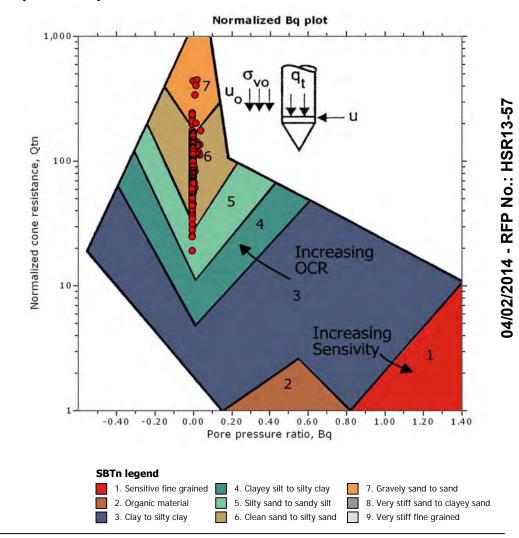




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

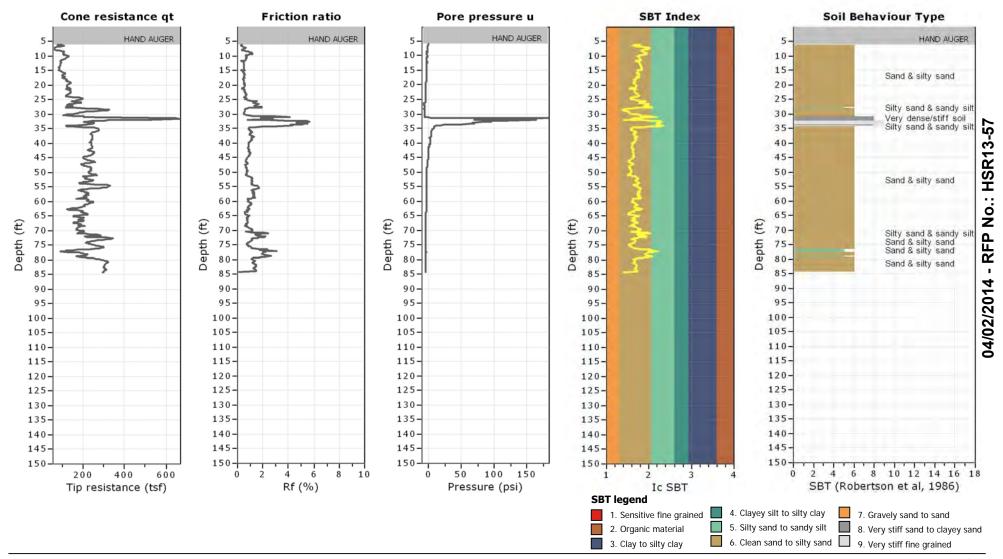
Location: Fresno-Bakersfield

CPT: S0074CPT

Total depth: 84.32 ft

Surface Elevation: 270.86 ft

Coords: X:6342620.02, Y:2088538.52





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**Project: California High-Speed Train** 

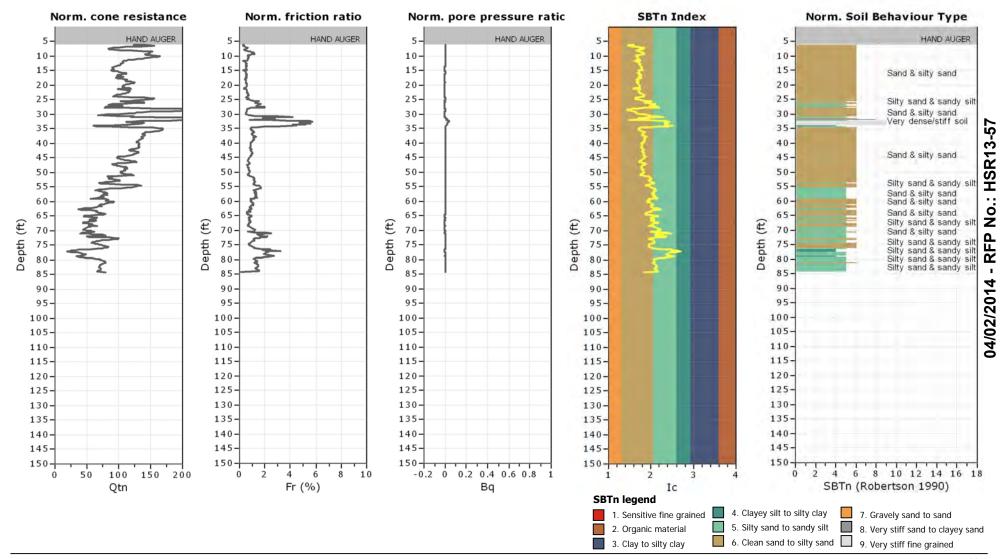
Location: Fresno-Bakersfield

CPT: S0074CPT

Total depth: 84.32 ft

Surface Elevation: 270.86 ft

Coords: X:6342620.02, Y:2088538.52



Project: California High-Speed Train

Location: Fresno-Bakersfield

CPT: S0075CPT

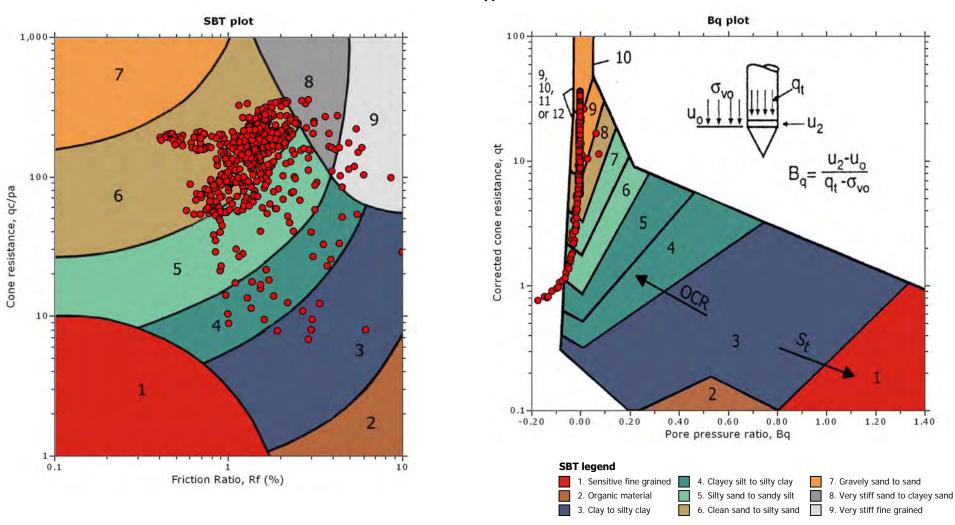
Total depth: 106.30 ft

Surface Elevation: 275.39 ft

Coords: X:6344347.96, Y:2088482.93

Cone Operator: Unknown

# SBT - Bq plots

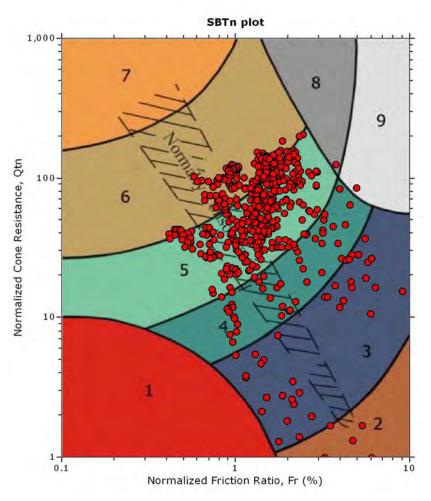


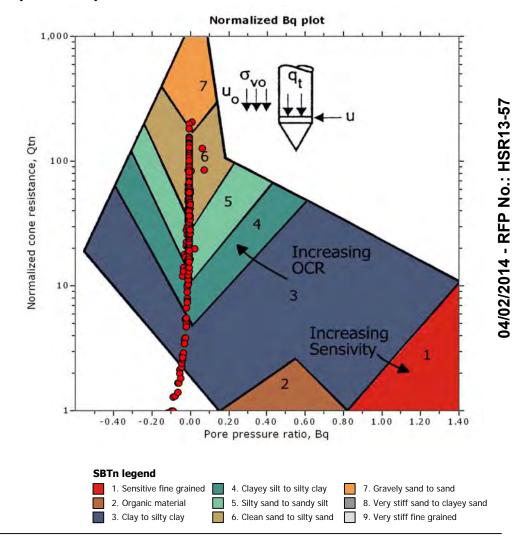
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

Total depth: 106.30 ft Surface Elevation: 275.39 ft Coords: X:6344347.96, Y:2088482.93

Cone Operator: Unknown







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**Project: California High-Speed Train** 

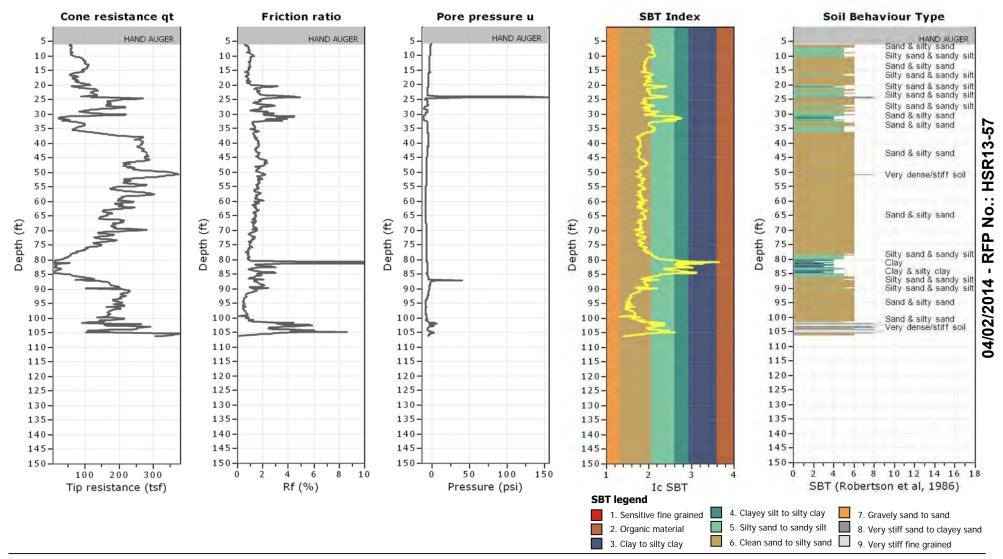
Location: Fresno-Bakersfield

CPT: S0075CPT

Total depth: 106.30 ft

Surface Elevation: 275.39 ft

Coords: X:6344347.96, Y:2088482.93





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**Project: California High-Speed Train** 

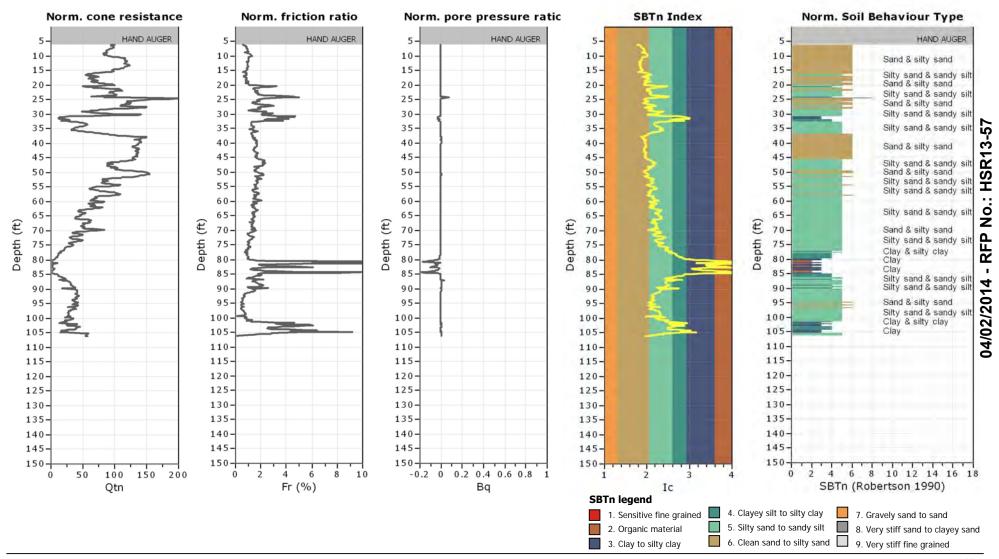
Location: Fresno-Bakersfield

CPT: S0075CPT

Total depth: 106.30 ft

Surface Elevation: 275.39 ft

Coords: X:6344347.96, Y:2088482.93

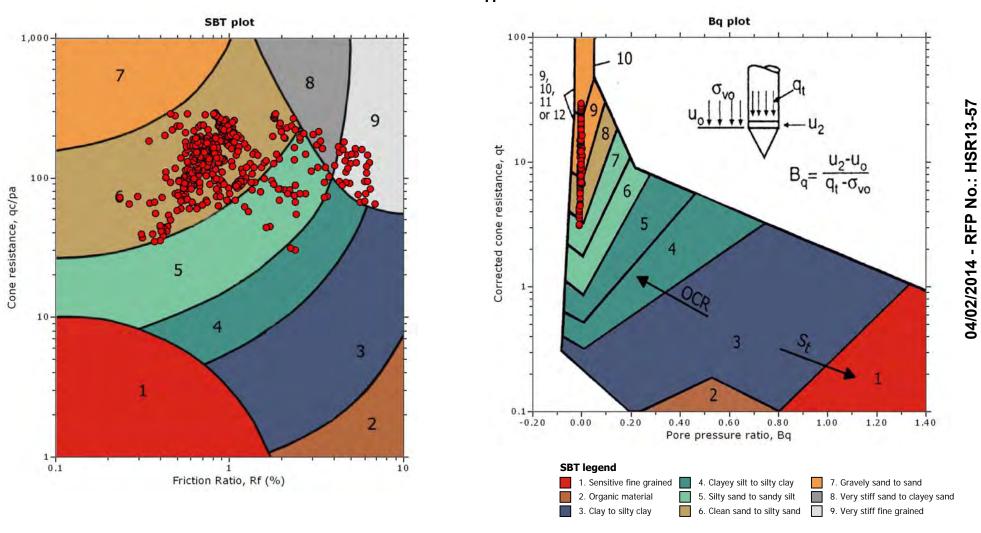


**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

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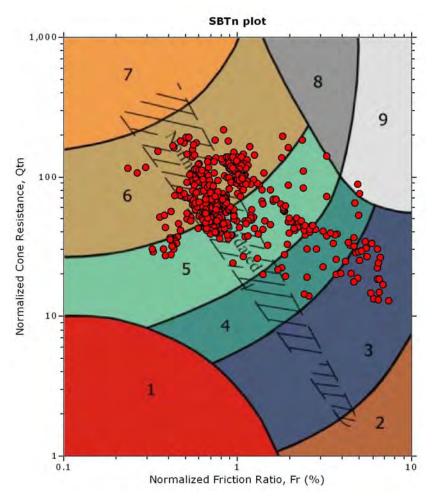


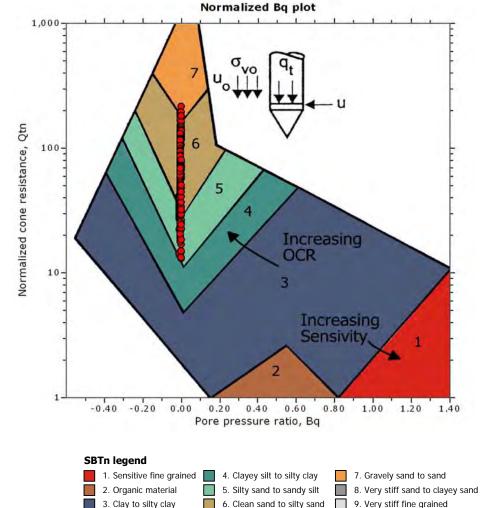




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







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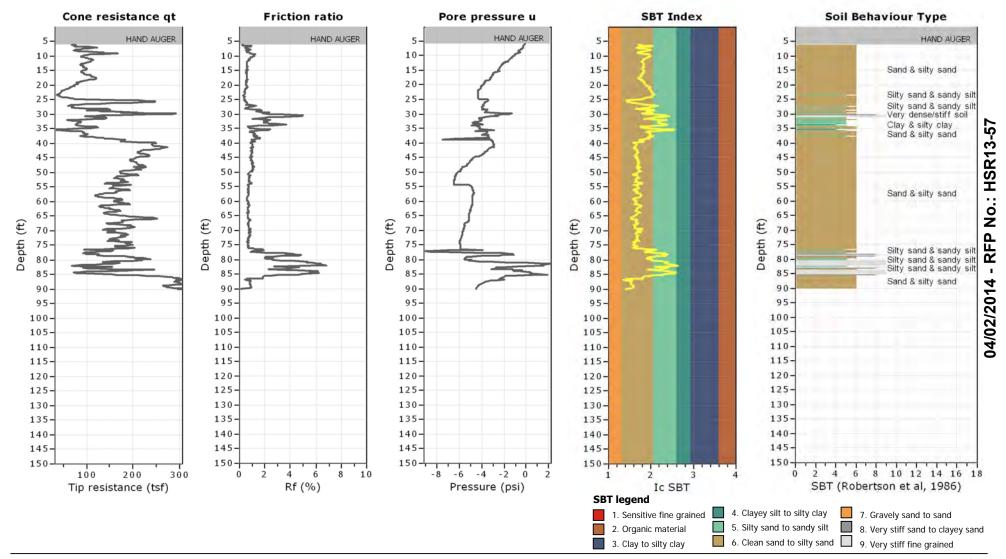
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0076CPT

Total depth: 90.06 ft

Surface Elevation: 272.70 ft Coords: X:6345224.08. Y:2087224.91





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**Project: California High-Speed Train** 

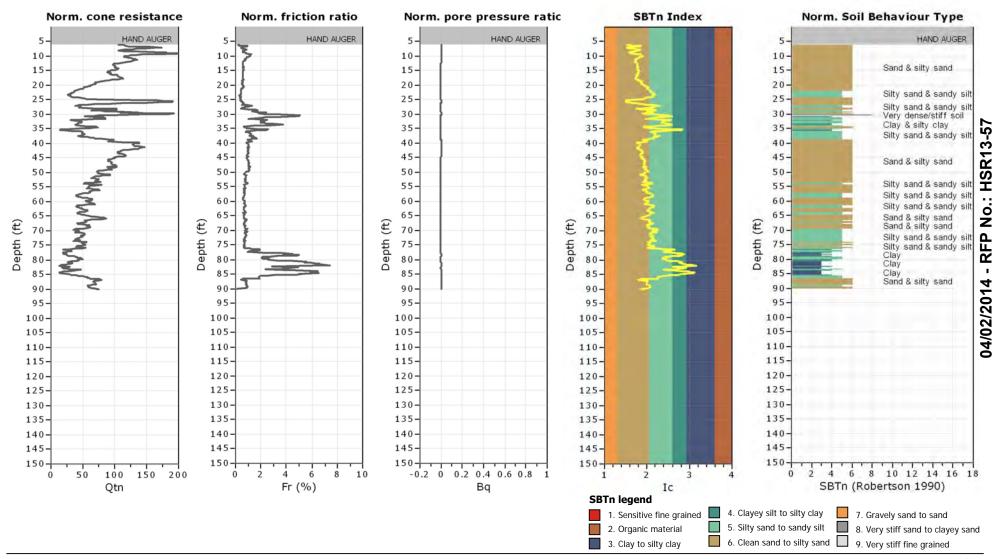
Location: Fresno-Bakersfield

CPT: S0076CPT

Total depth: 90.06 ft

Surface Elevation: 272.70 ft

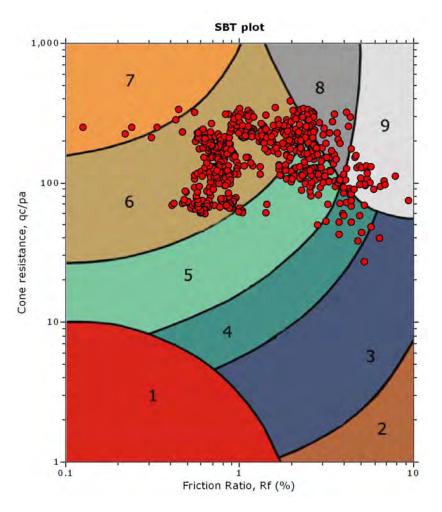
Coords: X:6345224.08, Y:2087224.91

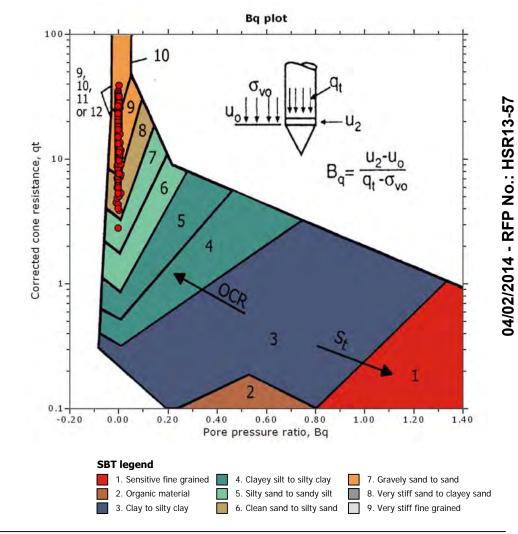


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**Project: California High-Speed Train** Location: Fresno-Bakersfield

# SBT - Bq plots



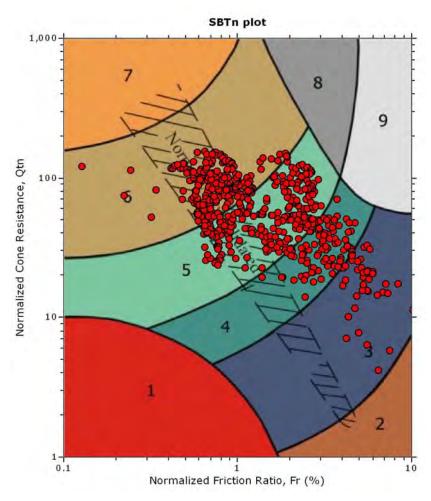


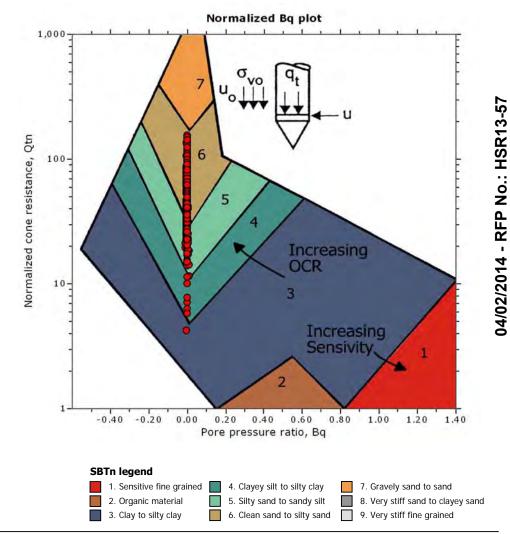
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 110.24 ft Surface Elevation: 274.23 ft Coords: X:6345178.07, Y:2083334.54

Cone Operator: Unknown







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**Project: California High-Speed Train** 

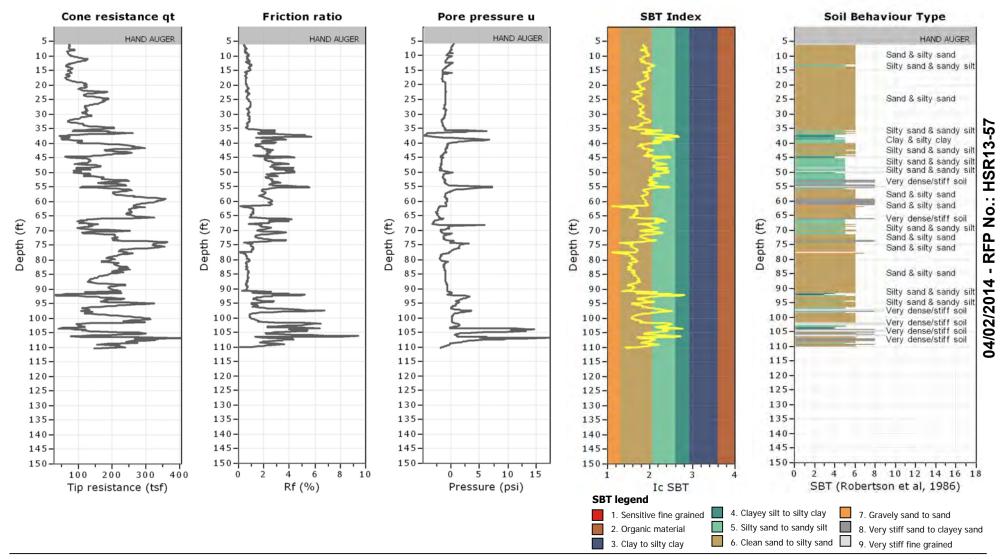
Location: Fresno-Bakersfield

CPT: S0078CPT

Total depth: 110.24 ft

Surface Elevation: 274.23 ft

Coords: X:6345178.07, Y:2083334.54





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**Project: California High-Speed Train** 

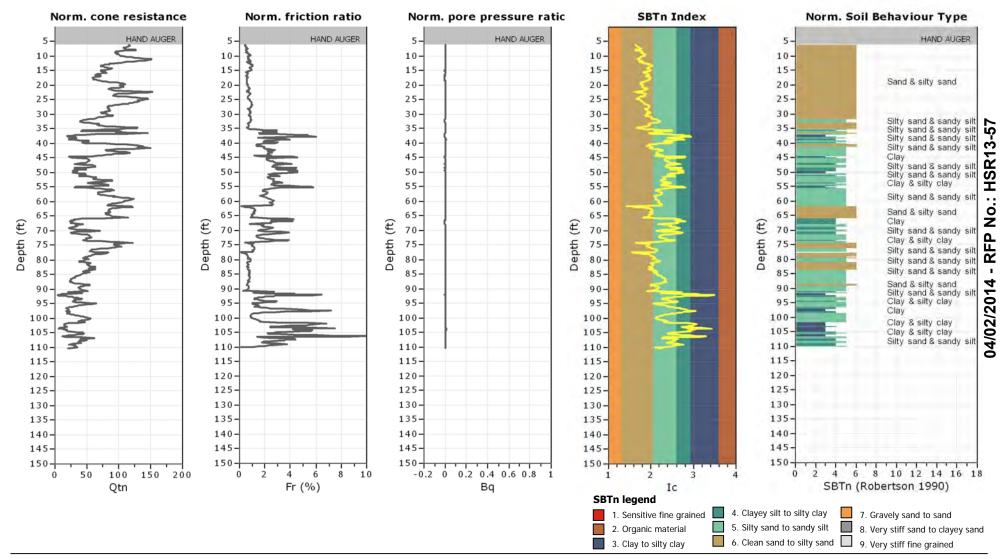
Location: Fresno-Bakersfield

CPT: S0078CPT

Total depth: 110.24 ft

Surface Elevation: 274.23 ft

Coords: X:6345178.07, Y:2083334.54



**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

**CPT: S0079CPT** 

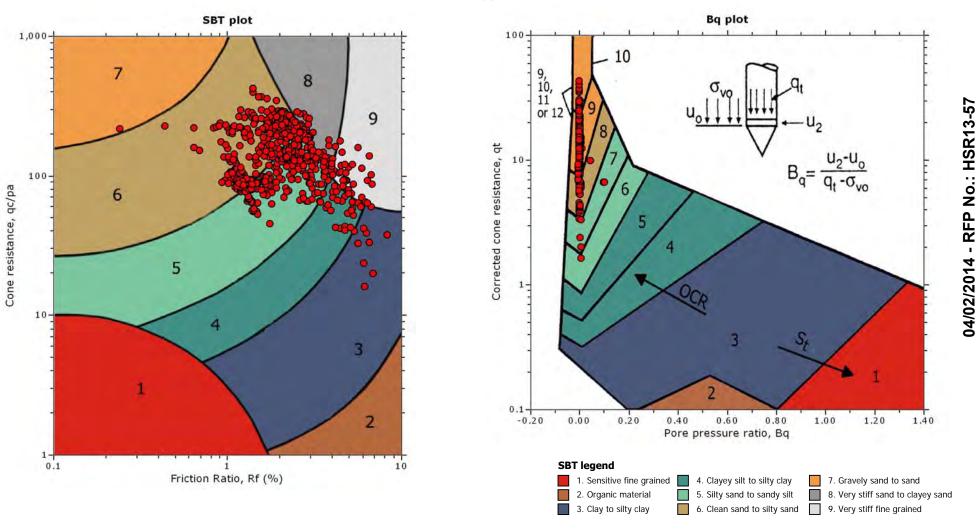
Total depth: 108.60 ft

Surface Elevation: 274.92 ft Coords: X:6345762.08, Y:2083225.21

Cone Operator: Unknown

#### Cone Operator: Unknow

# SBT - Bq plots



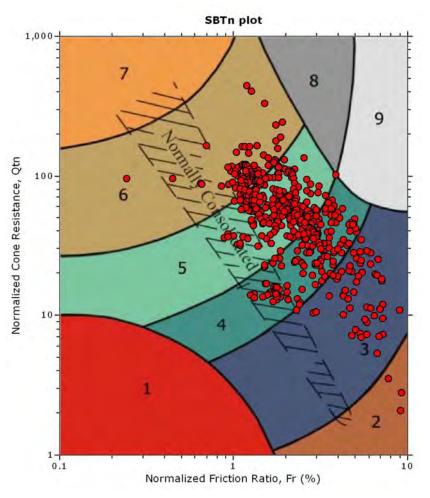


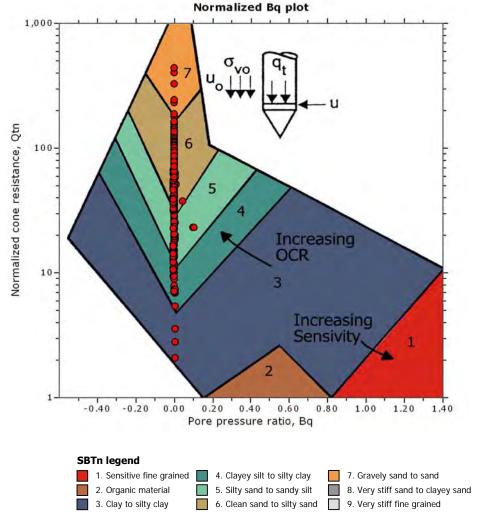
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

Total depth: 108.60 ft Surface Elevation: 274.92 ft Coords: X:6345762.08, Y:2083225.21

Cone Operator: Unknown







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**Project: California High-Speed Train** 

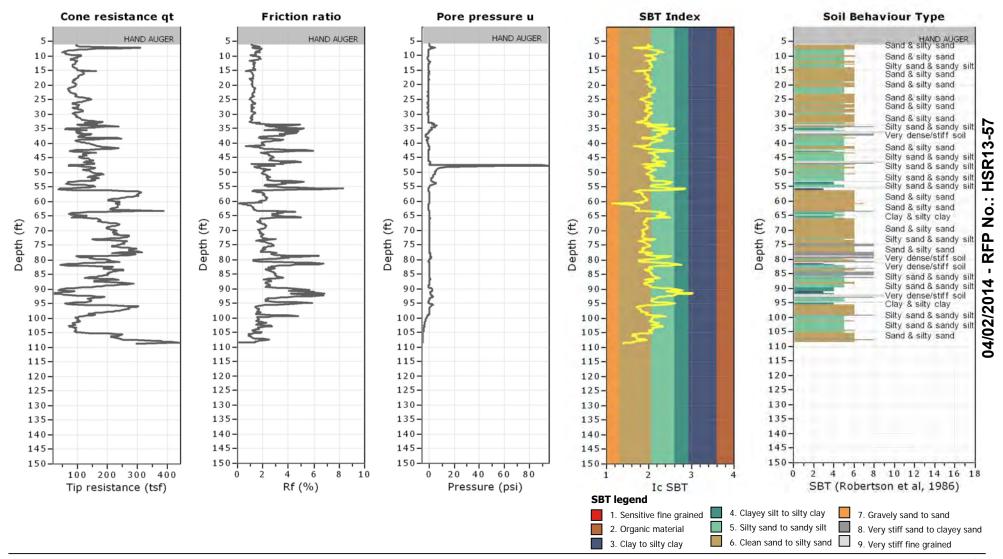
Location: Fresno-Bakersfield

CPT: S0079CPT

Total depth: 108.60 ft

Surface Elevation: 274.92 ft

Coords: X:6345762.08, Y:2083225.21





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**Project: California High-Speed Train** 

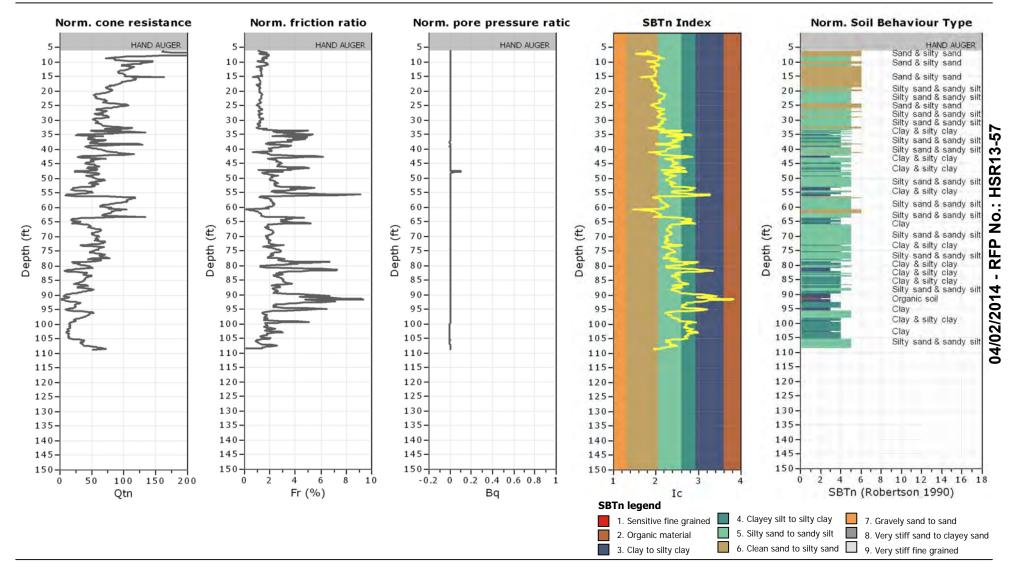
Location: Fresno-Bakersfield

**CPT: S0079CPT** 

Total depth: 108.60 ft

Surface Elevation: 274.92 ft

Coords: X:6345762.08, Y:2083225.21



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0080CPT

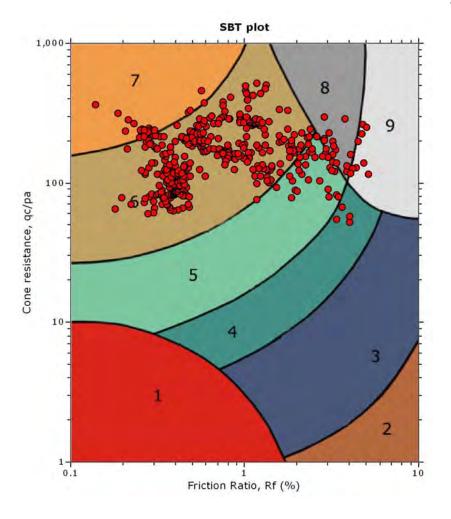
Total depth: 80.05 ft

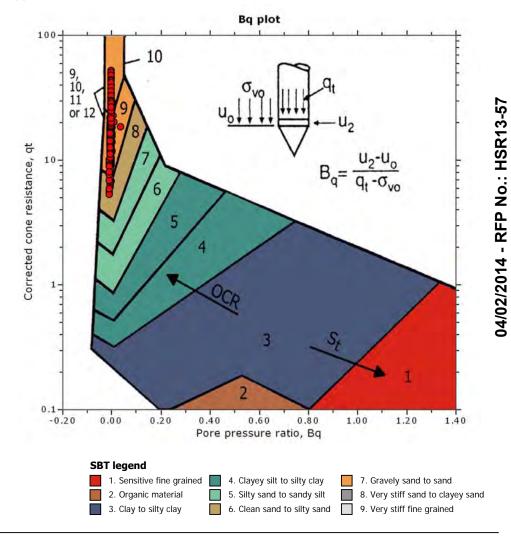
Surface Elevation: 269.19 ft

Coords: X:6345161.66, Y:2080966.45

Cone Operator: Unknown

# SBT - Bq plots





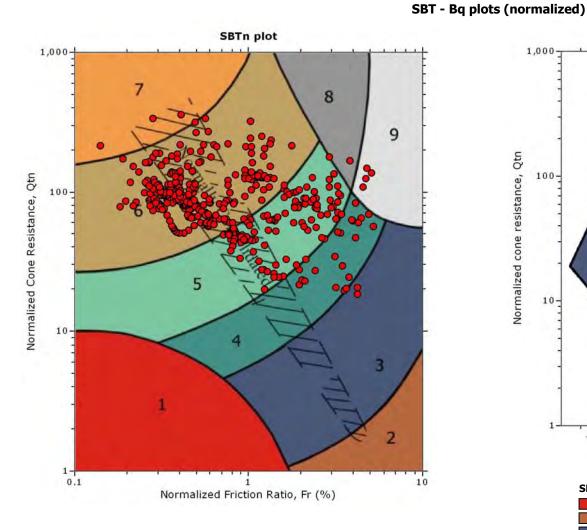
04/02/2014 - RFP No.: HSR13-57

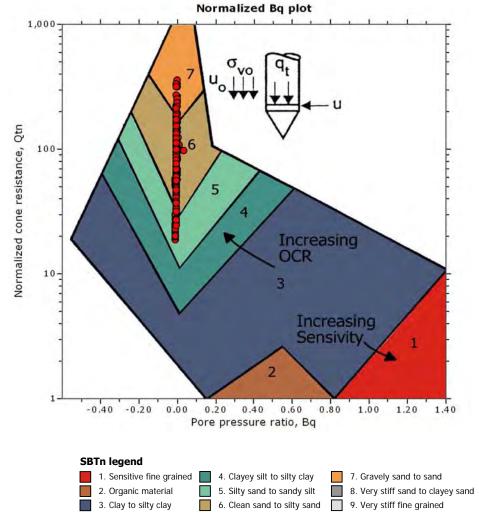


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**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







www.hsr.ca.gov

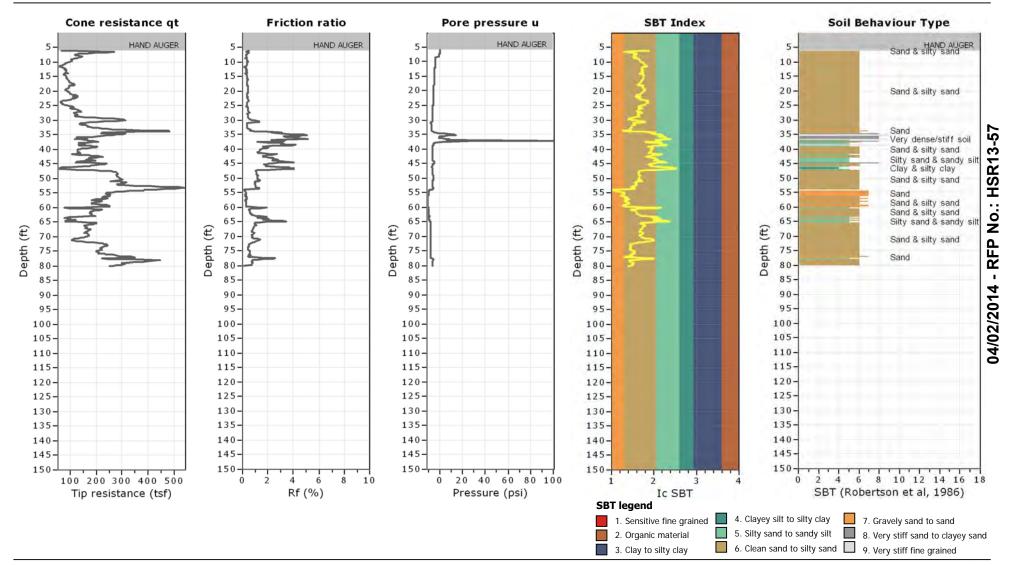
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0080CPT

Total depth: 80.05 ft

Surface Elevation: 269.19 ft Coords: X:6345161.66. Y:2080966.45





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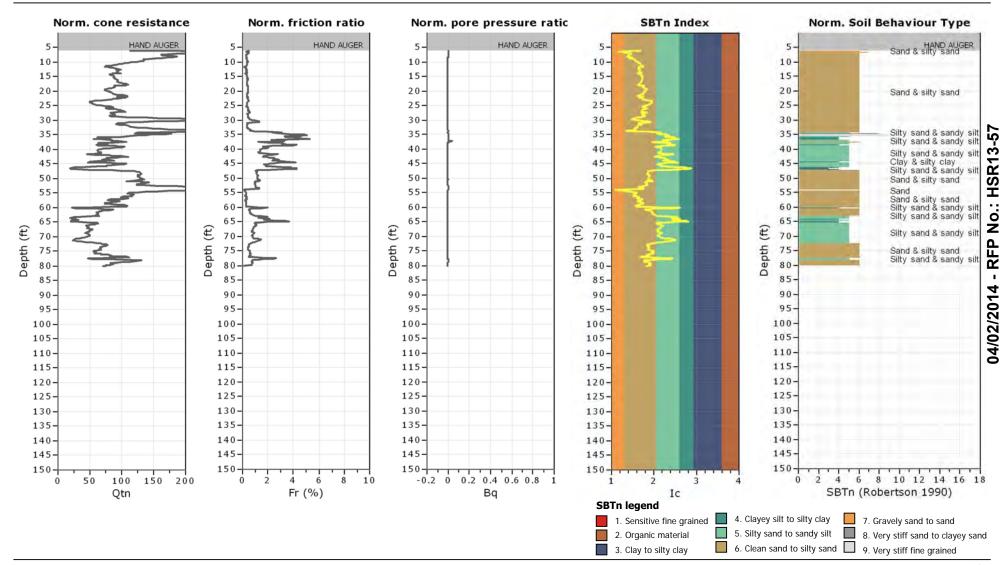
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0080CPT

Total depth: 80.05 ft

Surface Elevation: 269.19 ft Coords: X:6345161.66. Y:2080966.45



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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0082CPT

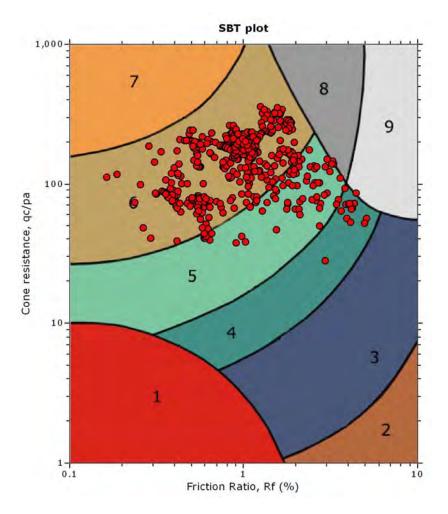
Total depth: 90.55 ft

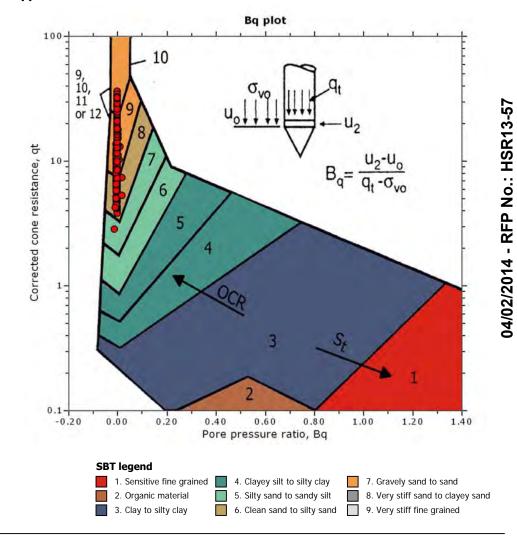
Surface Elevation: 264.80 ft

Coords: X:6347501.64, Y:2077885.02

Cone Operator: Unknown

# SBT - Bq plots



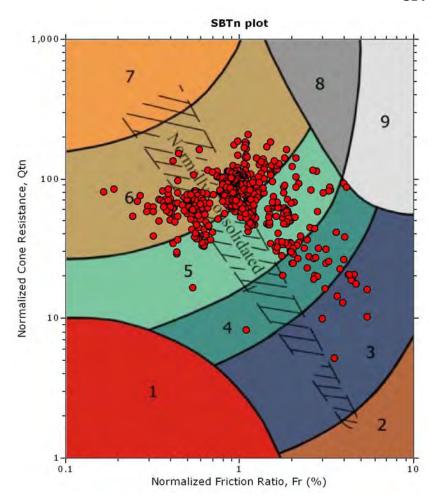


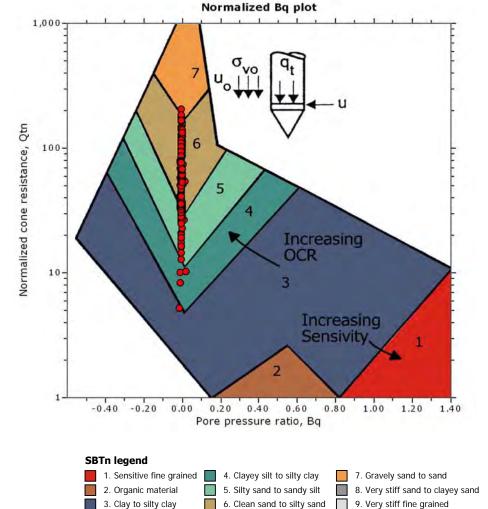
# URS HMM ARUP

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

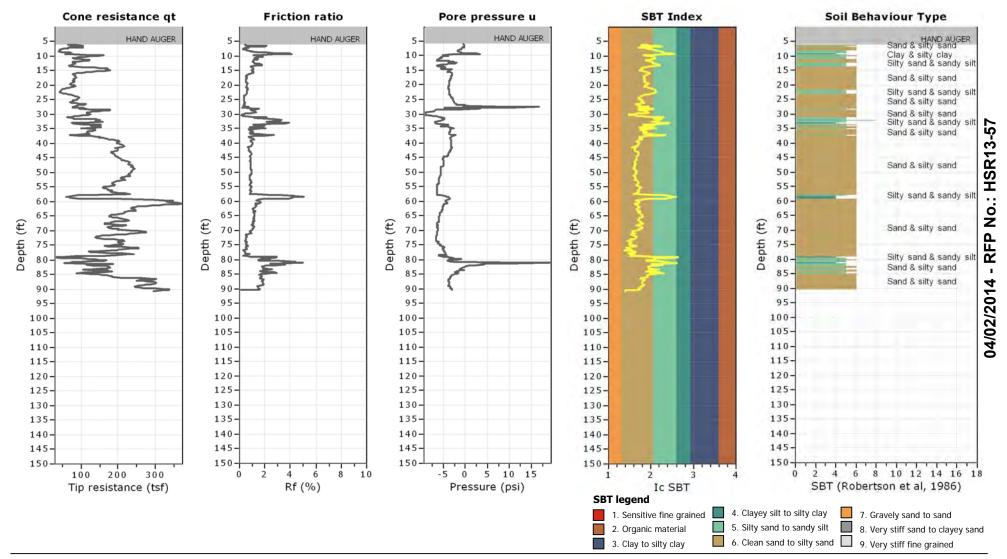
Location: Fresno-Bakersfield

CPT: S0082CPT

Total depth: 90.55 ft

Surface Elevation: 264.80 ft

Coords: X:6347501.64, Y:2077885.02





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**Project: California High-Speed Train** 

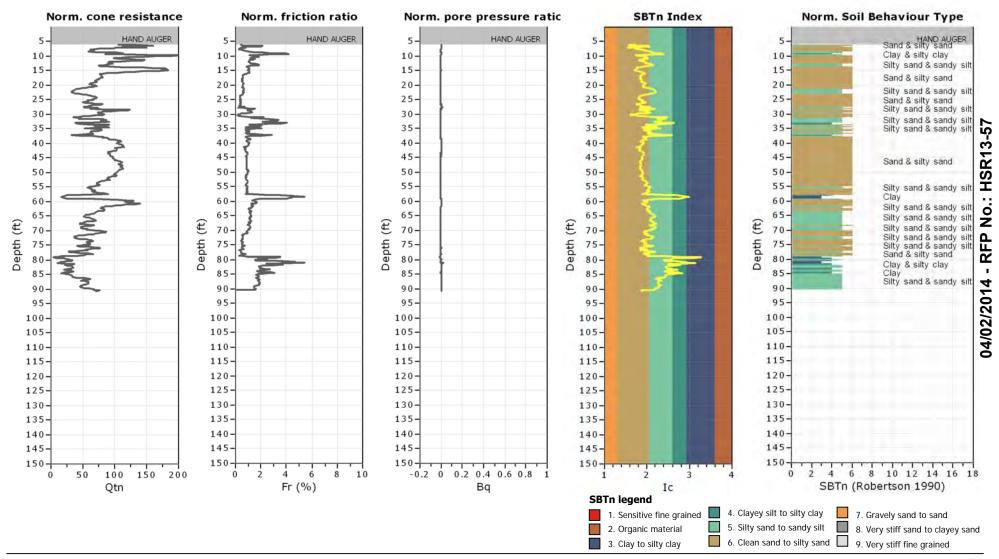
Location: Fresno-Bakersfield

CPT: S0082CPT

Total depth: 90.55 ft

Surface Elevation: 264.80 ft

Coords: X:6347501.64, Y:2077885.02



SBT plot

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

1,000-

100-

0.1

Cone resistance, qc/pa

CPT: S0084CPT

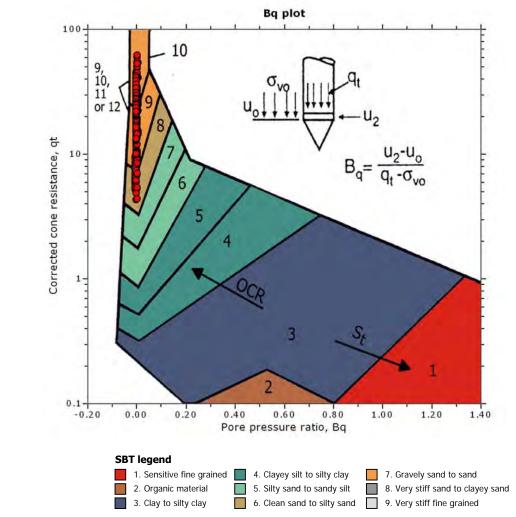
Total depth: 99.25 ft

Surface Elevation: 261.25 ft

Coords: X:6347848.80, Y:2075038.72

Cone Operator: Unknown

# SBT - Bq plots





Friction Ratio, Rf (%)

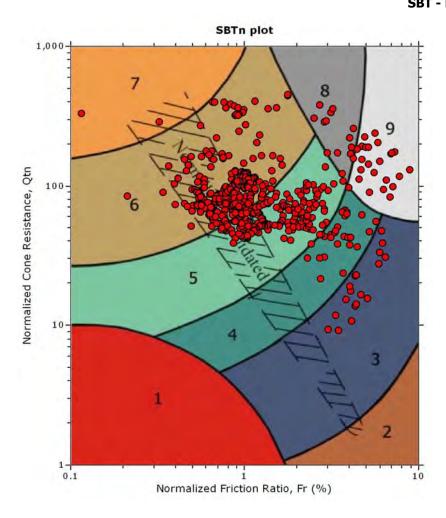
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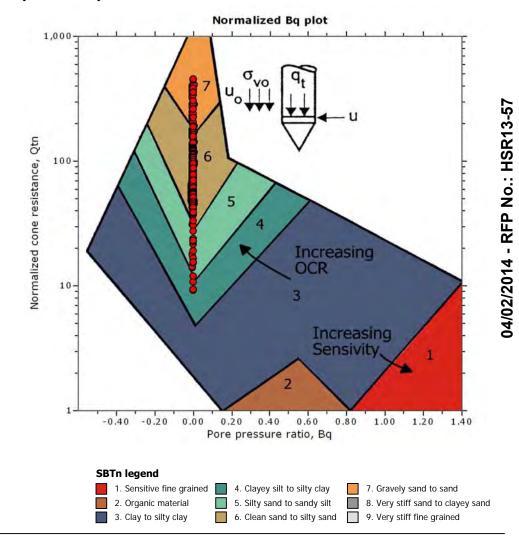
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**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

URS HMM ARUP







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**Project: California High-Speed Train** 

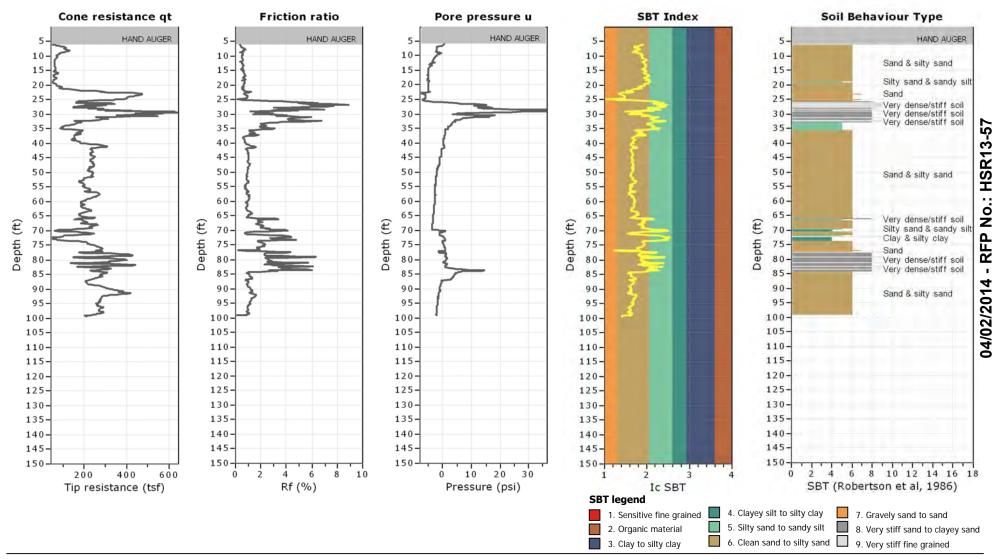
Location: Fresno-Bakersfield

CPT: S0084CPT

Total depth: 99.25 ft

Surface Elevation: 261.25 ft

Coords: X:6347848.80, Y:2075038.72





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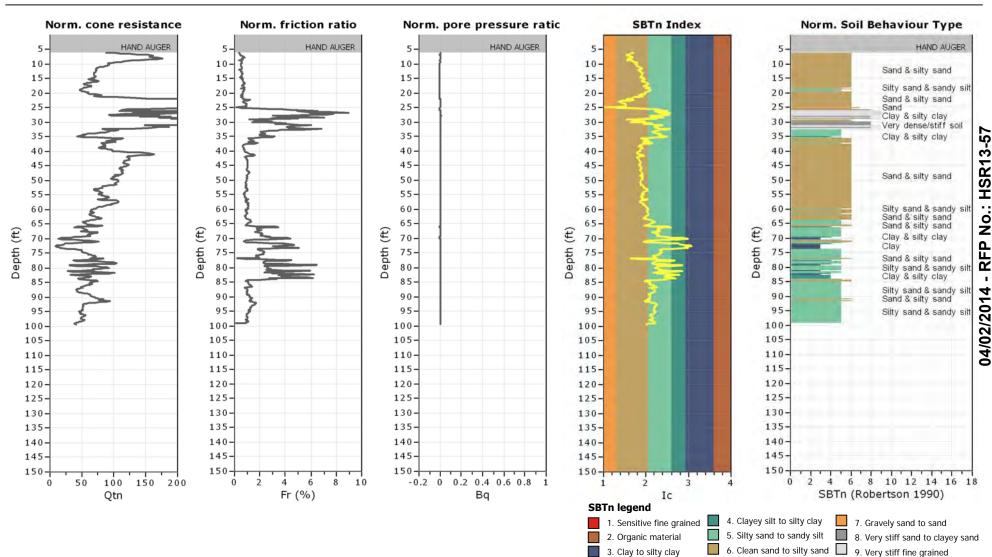
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0084CPT

Total depth: 99.25 ft

Surface Elevation: 261.25 ft Coords: X:6347848.80. Y:2075038.72



WWW.1131.C

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

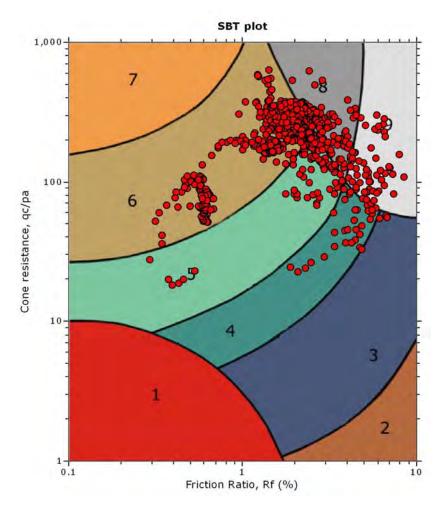
CPT: S0086CPT

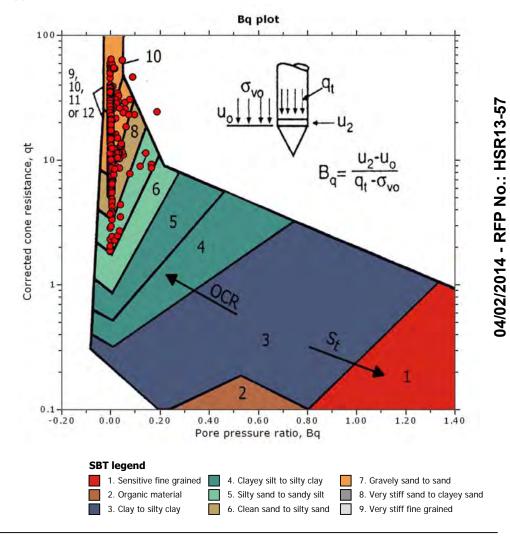
Total depth: 117.95 ft

Surface Elevation: 261.92 ft

Coords: X:6349328.50, Y:2072574.88

Cone Operator: Unknown





CPT: S0086CPT

Total depth: 117.95 ft Surface Elevation: 261.92 ft

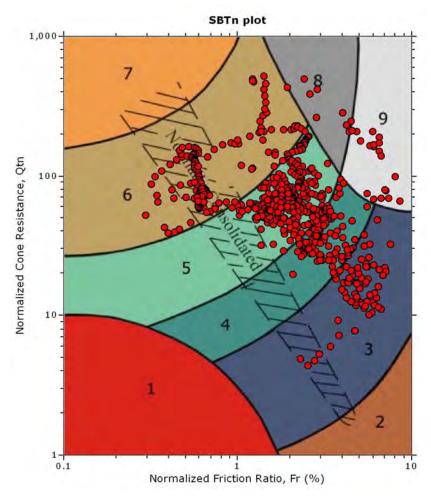
Coords: X:6349328.50, Y:2072574.88

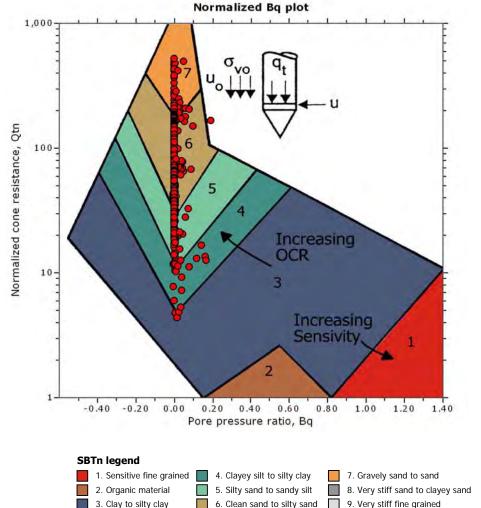
Cone Operator: Unknown

**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

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**Project: California High-Speed Train** 

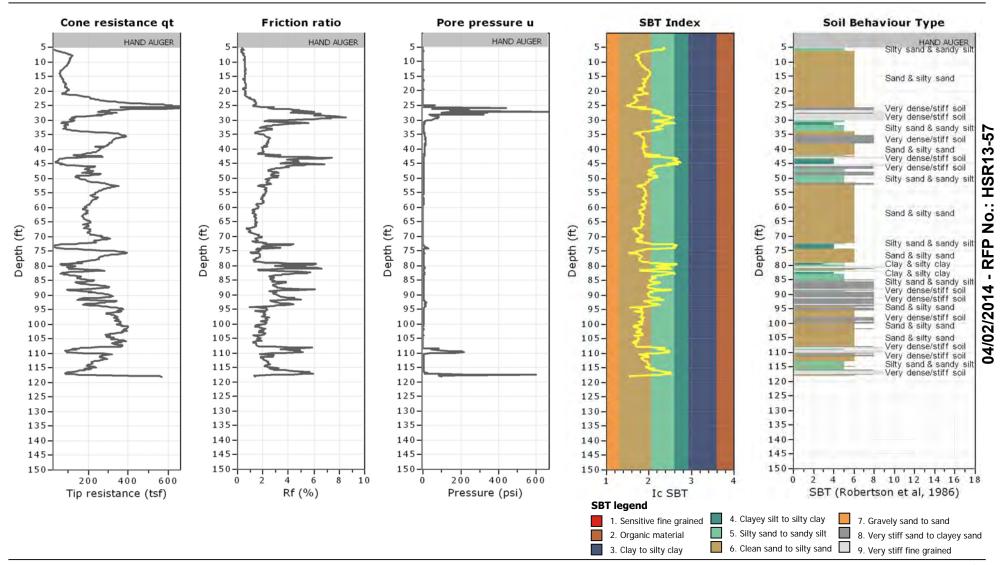
Location: Fresno-Bakersfield

CPT: S0086CPT

Total depth: 117.95 ft

Surface Elevation: 261.92 ft

Coords: X:6349328.50, Y:2072574.88





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**Project: California High-Speed Train** 

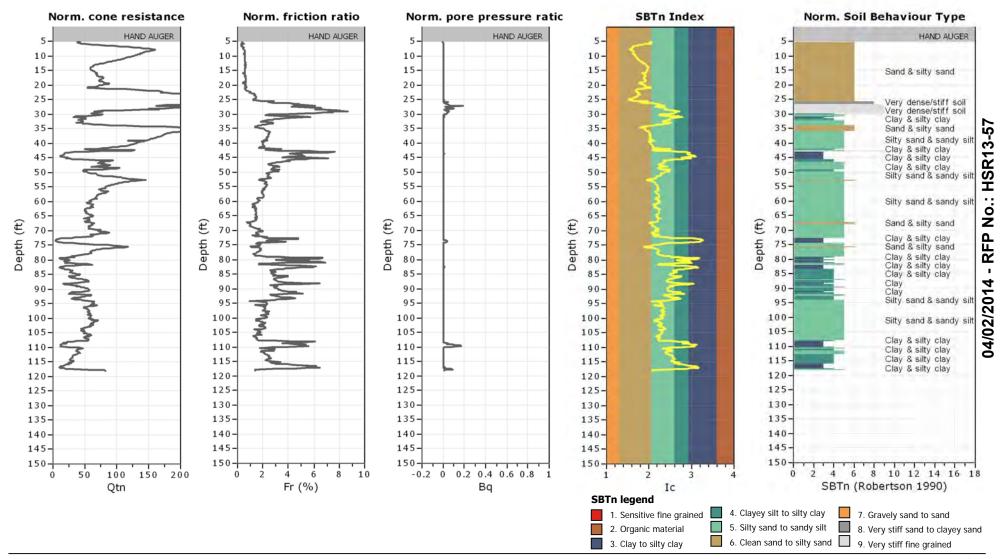
Location: Fresno-Bakersfield

CPT: S0086CPT

Total depth: 117.95 ft

Surface Elevation: 261.92 ft

Coords: X:6349328.50, Y:2072574.88



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

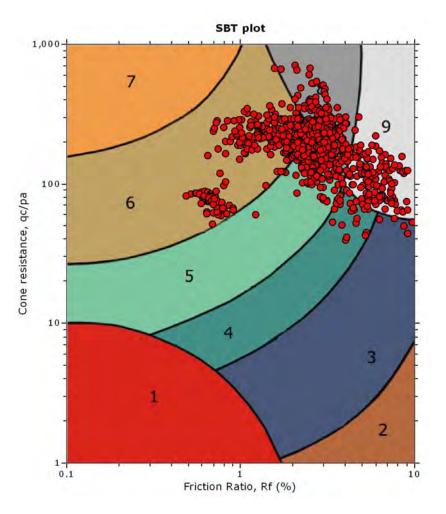
**CPT: S0087CPT** 

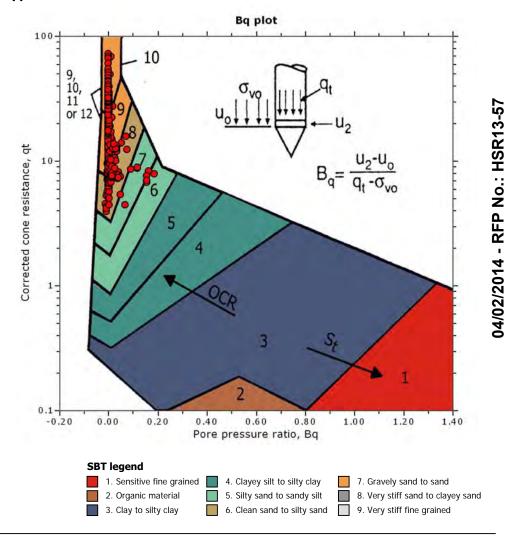
Total depth: 150.26 ft

Surface Elevation: 260.77 ft

Coords: X:6349620.63, Y:2071797.60

Cone Operator: Unknown



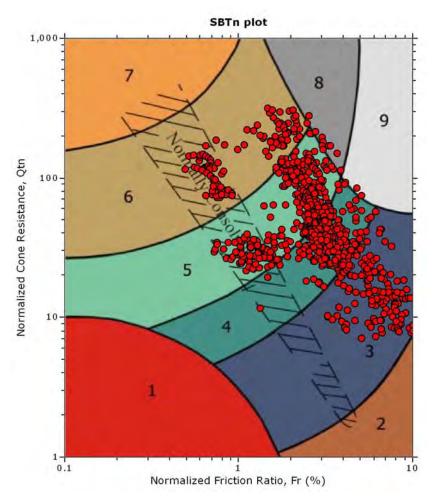


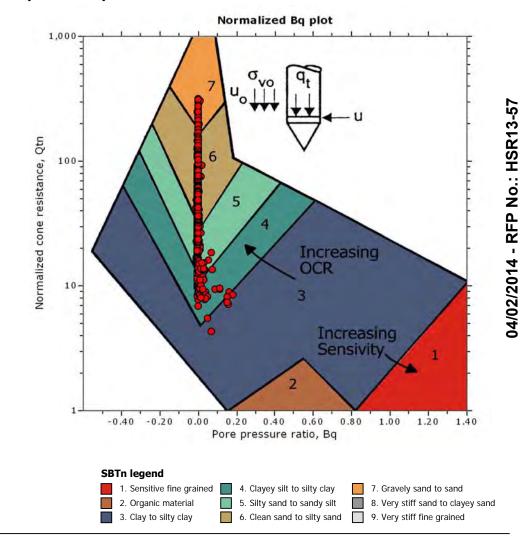
# URS HMM ARUP

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







**Project: California High-Speed Train** 

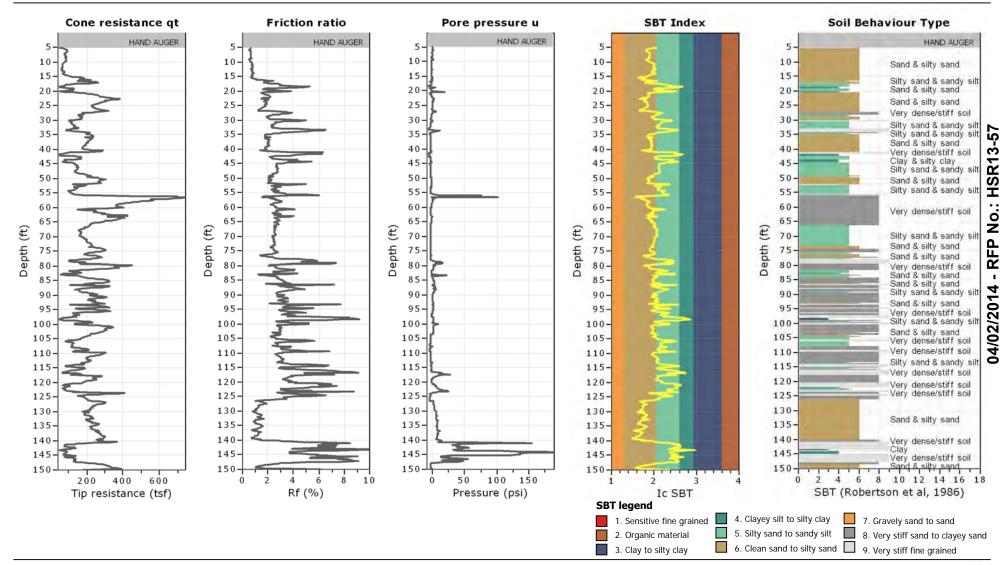
Location: Fresno-Bakersfield

CPT: S0087CPT

Total depth: 150.26 ft

Surface Elevation: 260.77 ft

Coords: X:6349620.63, Y:2071797.60





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**Project: California High-Speed Train** 

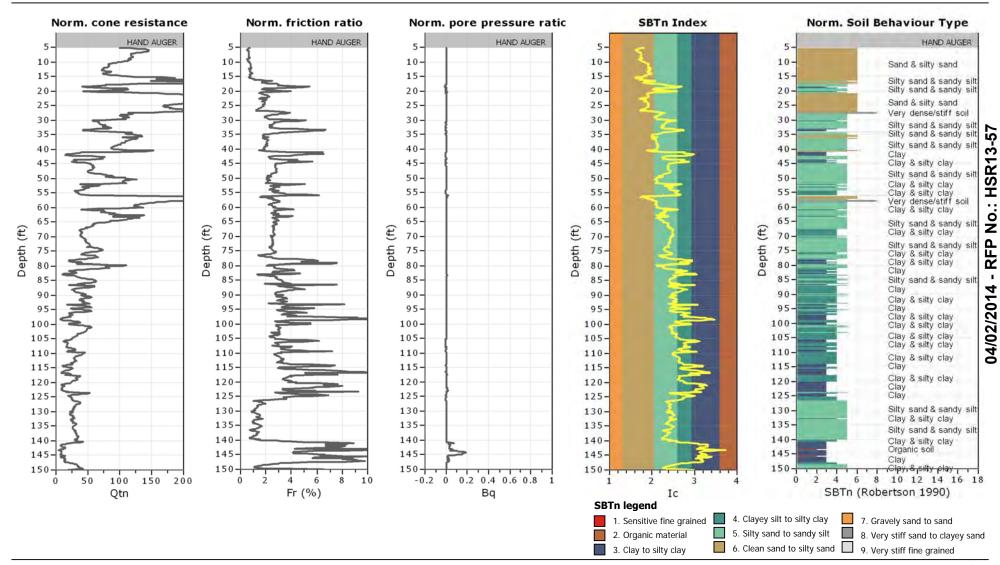
Location: Fresno-Bakersfield

CPT: S0087CPT

Total depth: 150.26 ft

Surface Elevation: 260.77 ft

Coords: X:6349620.63, Y:2071797.60



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

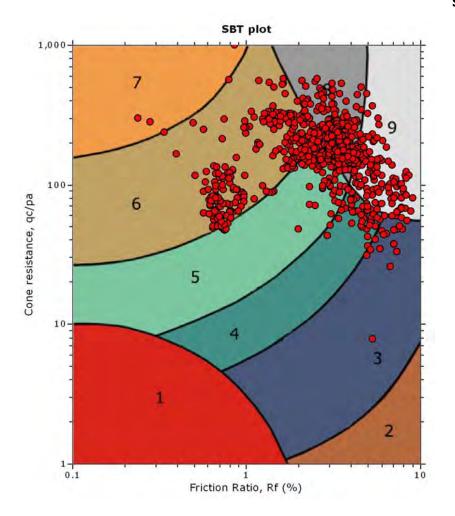
CPT: S0088CPT

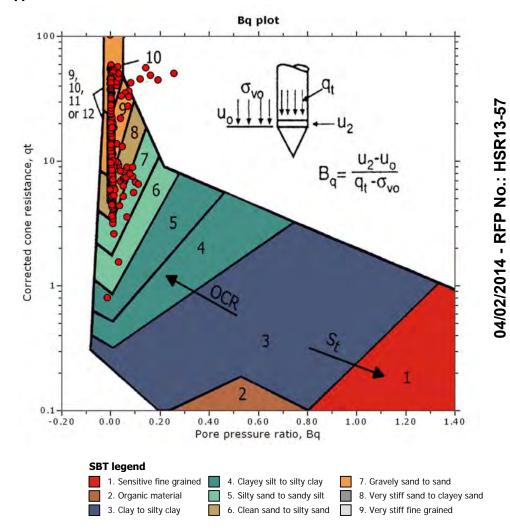
Total depth: 150.75 ft

Surface Elevation: 260.01 ft

Coords: X:6350086.50, Y:2070517.35

Cone Operator: Unknown





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

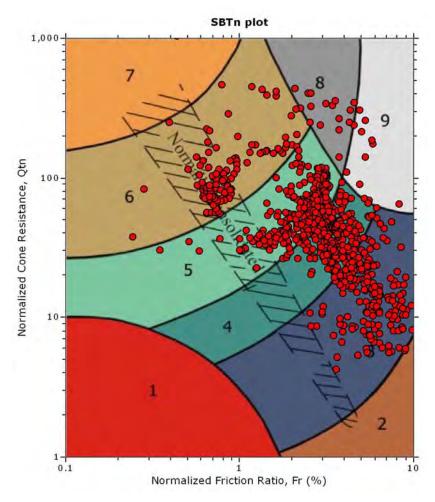
CPT: S0088CPT

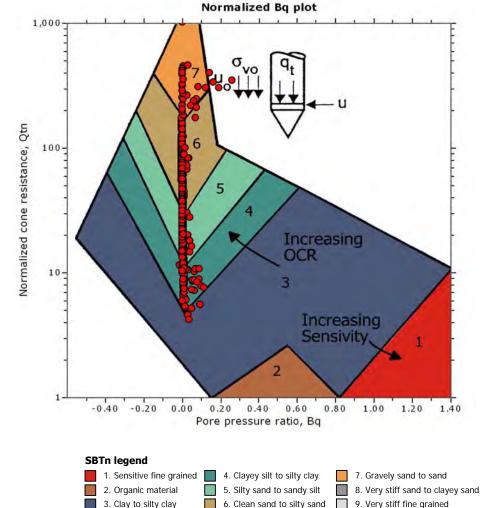
Total depth: 150.75 ft

Surface Elevation: 260.01 ft

Coords: X:6350086.50, Y:2070517.35

Cone Operator: Unknown





**Project: California High-Speed Train** 

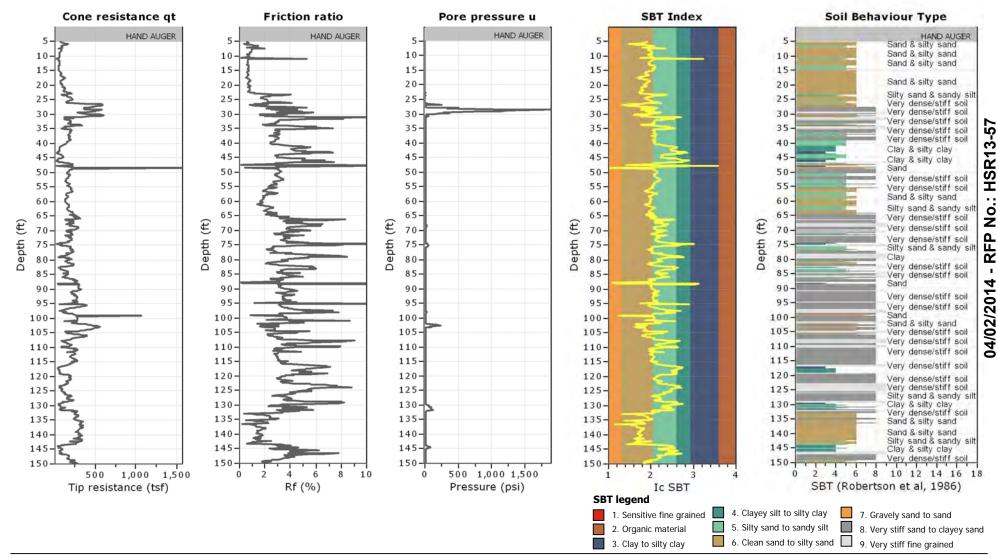
Location: Fresno-Bakersfield

CPT: S0088CPT

Total depth: 150.75 ft

Surface Elevation: 260.01 ft

Coords: X:6350086.50, Y:2070517.35





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**Project: California High-Speed Train** 

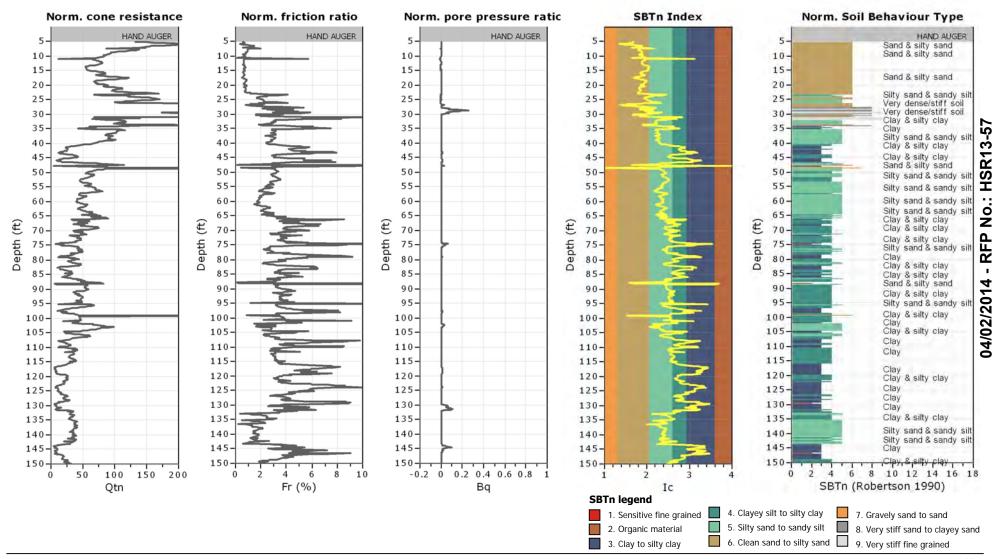
**Location: Fresno-Bakersfield** 

CPT: S0088CPT

Total depth: 150.75 ft

Surface Elevation: 260.01 ft

Coords: X:6350086.50, Y:2070517.35



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

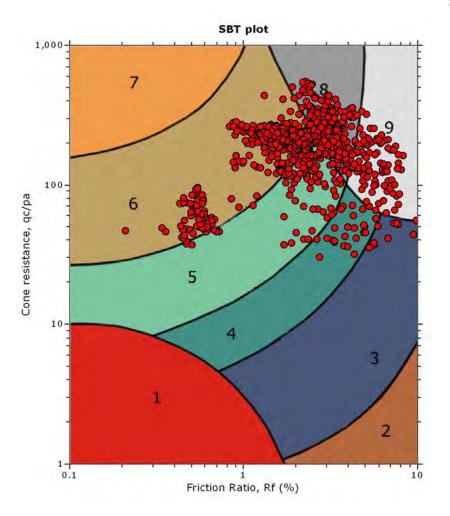
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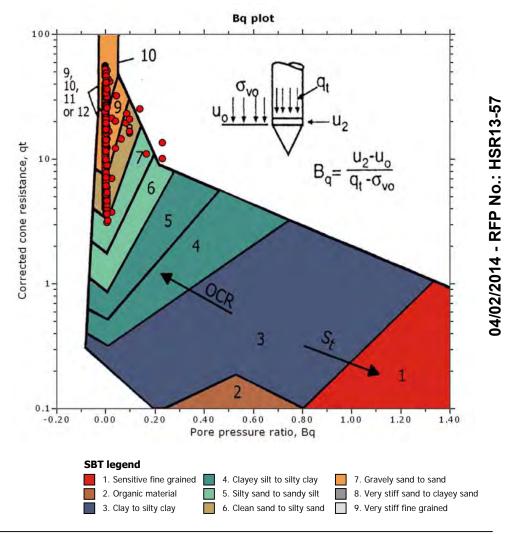
Total depth: 150.26 ft

Surface Elevation: 258.08 ft

Coords: X:6350372.06, Y:2068581.34

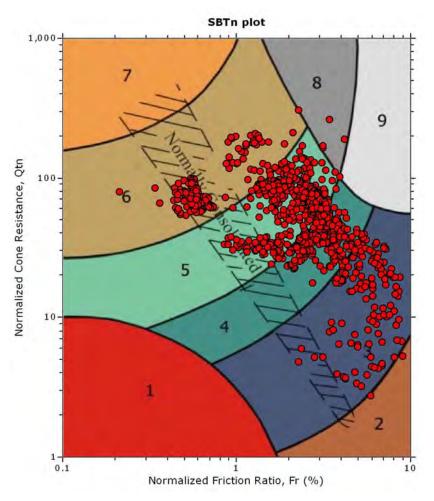
Cone Operator: Unknown

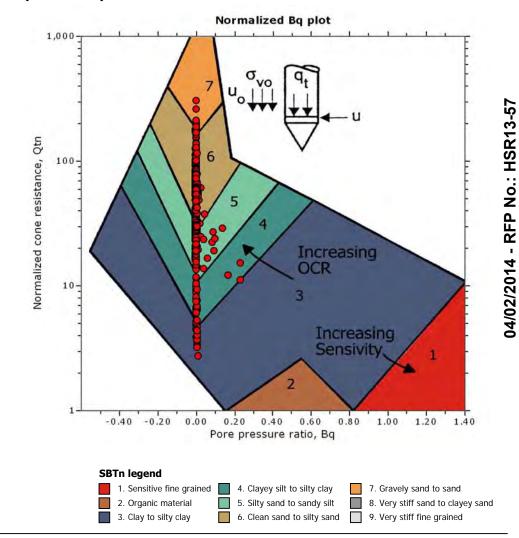




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







**Project: California High-Speed Train** 

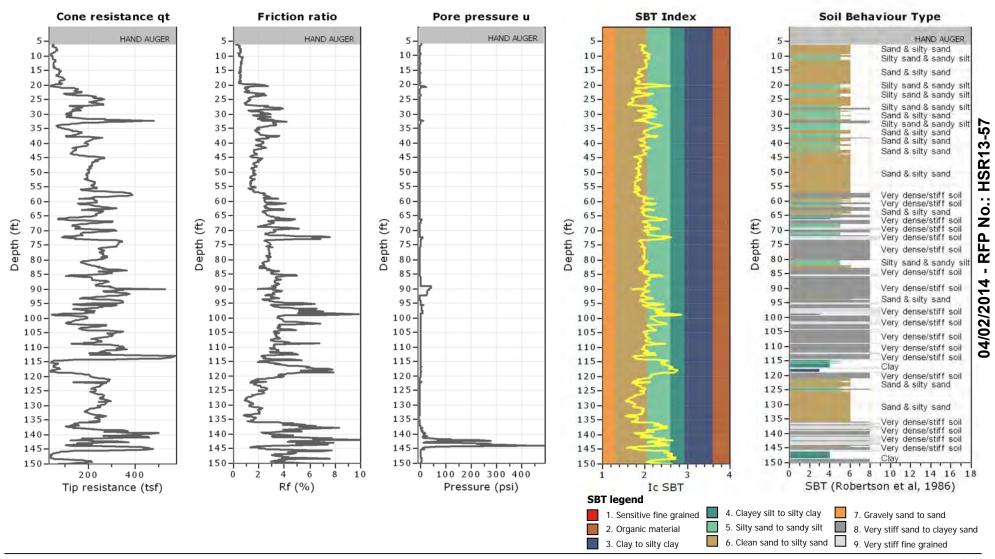
Location: Fresno-Bakersfield

CPT: S0089CPT

Total depth: 150.26 ft

Surface Elevation: 258.08 ft

Coords: X:6350372.06, Y:2068581.34





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**Project: California High-Speed Train** 

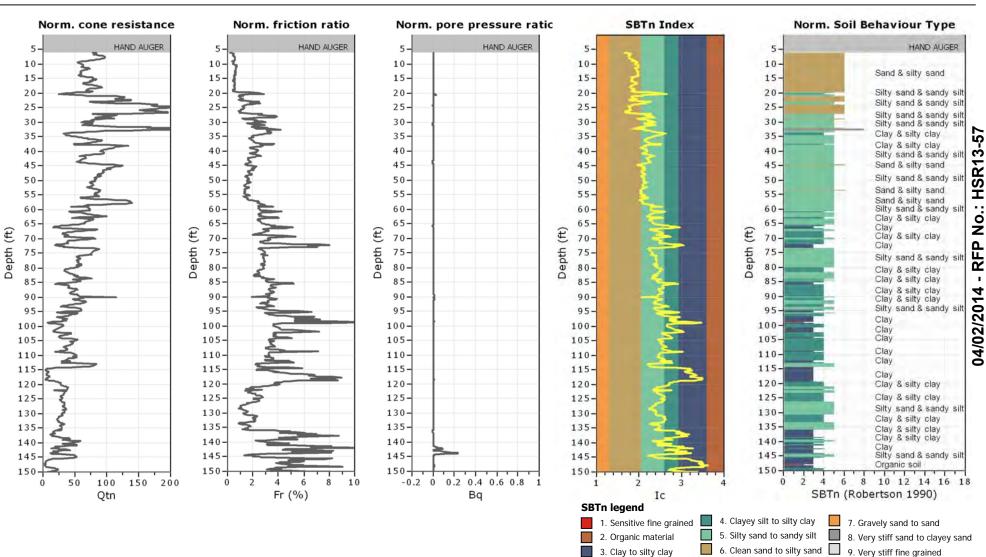
Location: Fresno-Bakersfield

CPT: S0089CPT

Total depth: 150.26 ft

Surface Elevation: 258.08 ft

Coords: X:6350372.06, Y:2068581.34



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

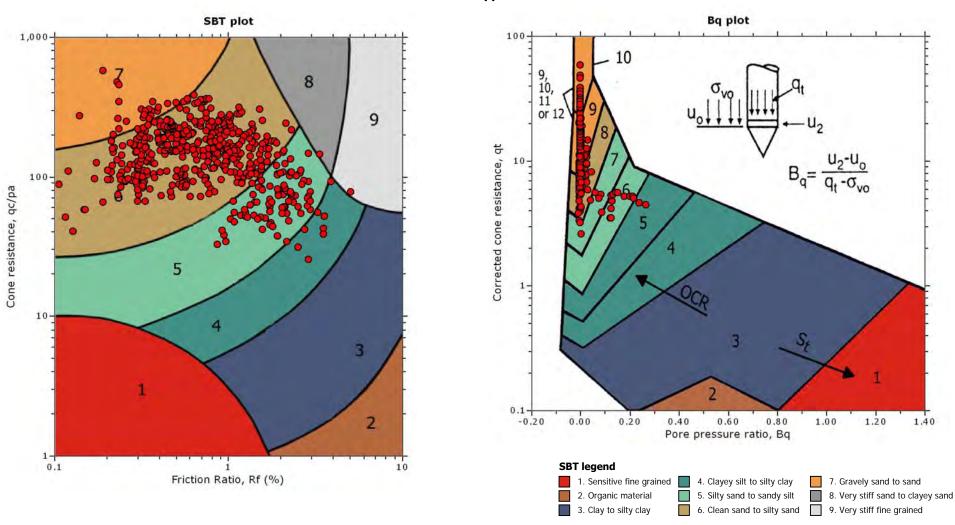
CPT: S0090CPT

Total depth: 105.31 ft

Surface Elevation: 260.75 ft

Coords: X:6355630.83, Y:2063357.19

Cone Operator: Unknown



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**Project: California High-Speed Train** 

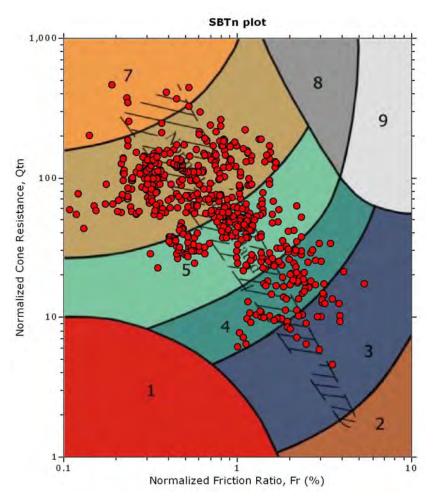
Location: Fresno-Bakersfield

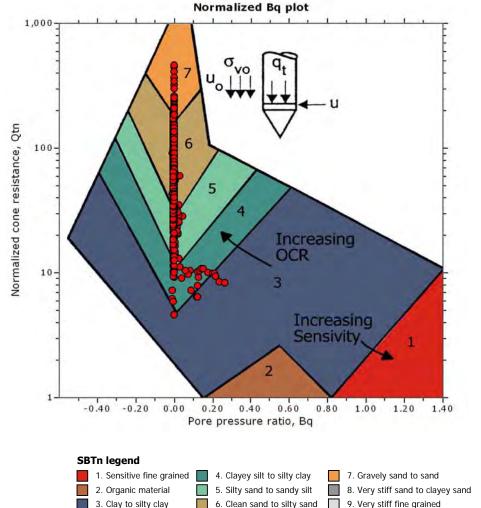
CPT: S0090CPT

Total depth: 105.31 ft Surface Elevation: 260.75 ft

Coords: X:6355630.83, Y:2063357.19

Cone Operator: Unknown







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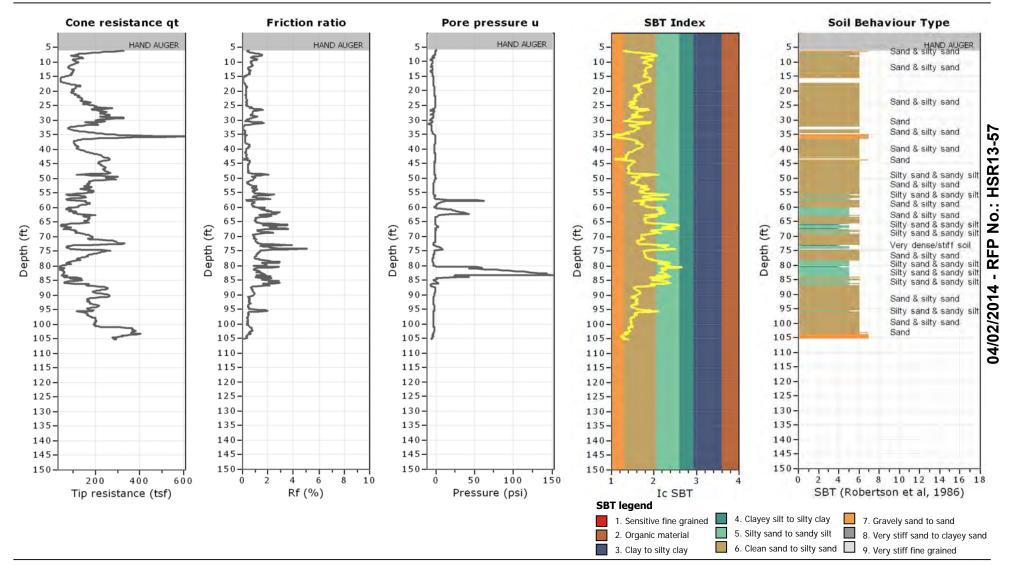
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0090CPT

Total depth: 105.31 ft Surface Elevation: 260.75 ft

Coords: X:6355630.83, Y:2063357.19





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**Project: California High-Speed Train** 

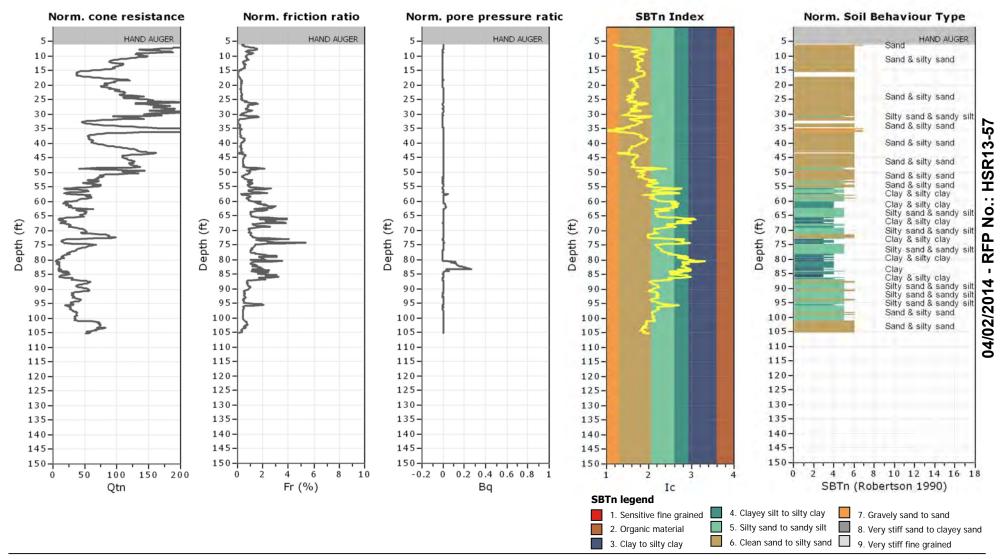
Location: Fresno-Bakersfield

CPT: S0090CPT

Total depth: 105.31 ft

Surface Elevation: 260.75 ft

Coords: X:6355630.83, Y:2063357.19



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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

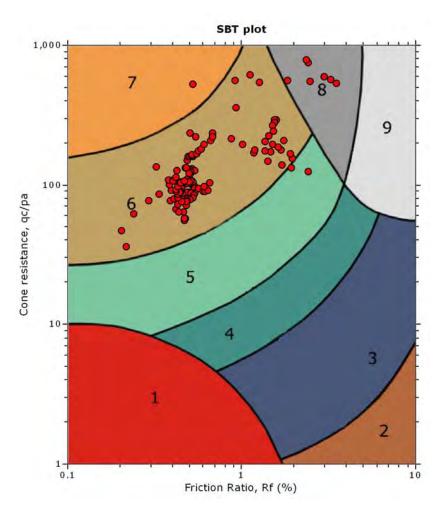
CPT: S0094ACPT

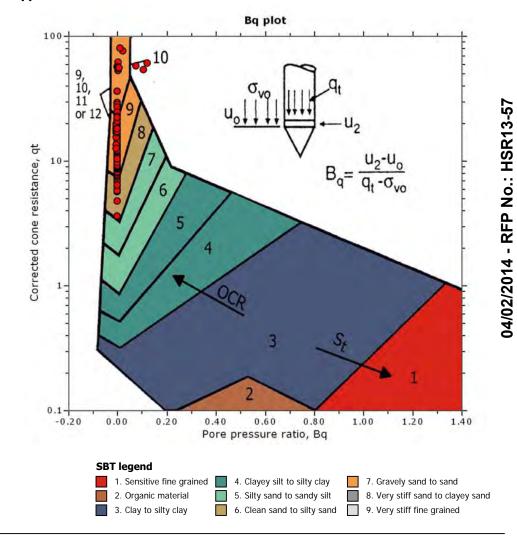
Total depth: 31.17 ft

Surface Elevation: 260.74 ft

Coords: X:6356867.58, Y:2061952.03

Cone Operator: Unknown





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

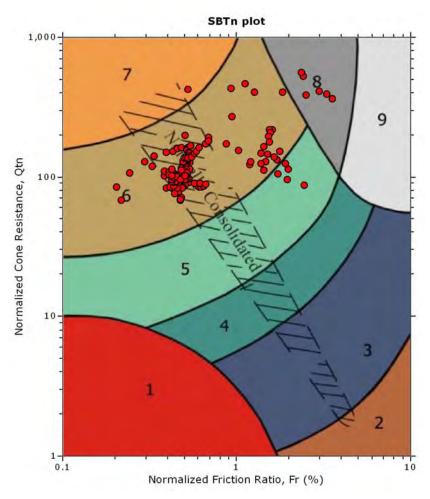
CPT: S0094ACPT

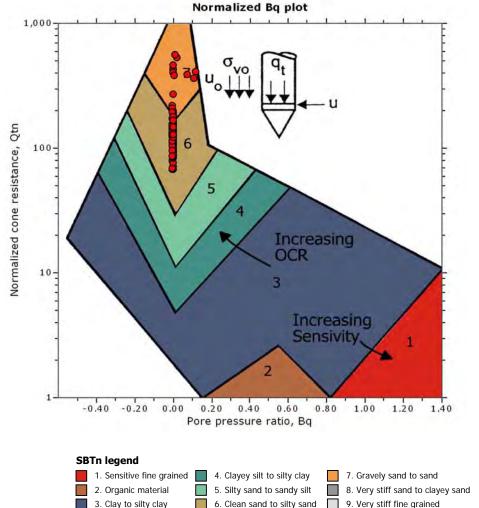
Total depth: 31.17 ft

Surface Elevation: 260.74 ft

Coords: X:6356867.58, Y:2061952.03

Cone Operator: Unknown







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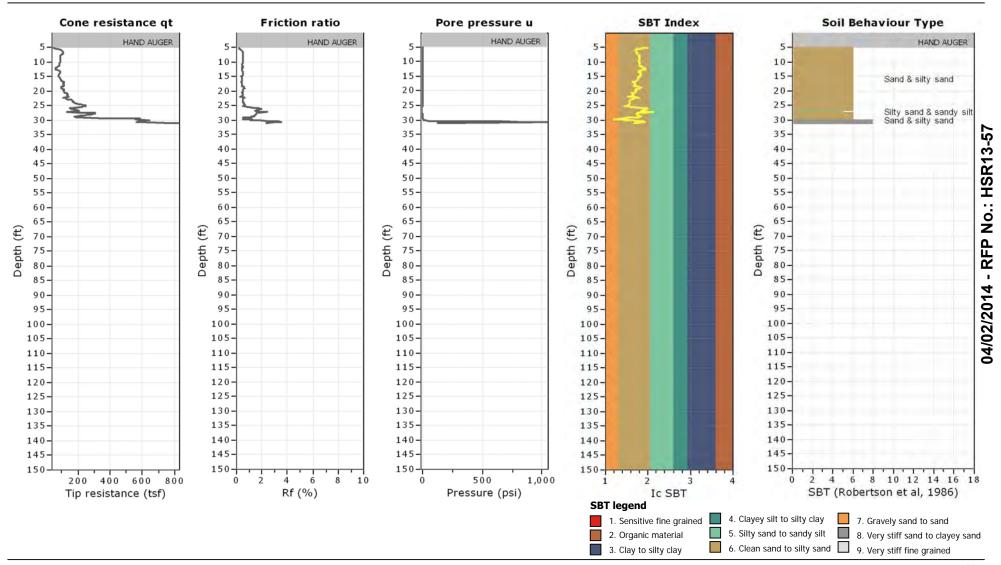
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0094ACPT

Total depth: 31.17 ft

Surface Elevation: 260.74 ft Coords: X:6356867.58, Y:2061952.03





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**Project: California High-Speed Train** 

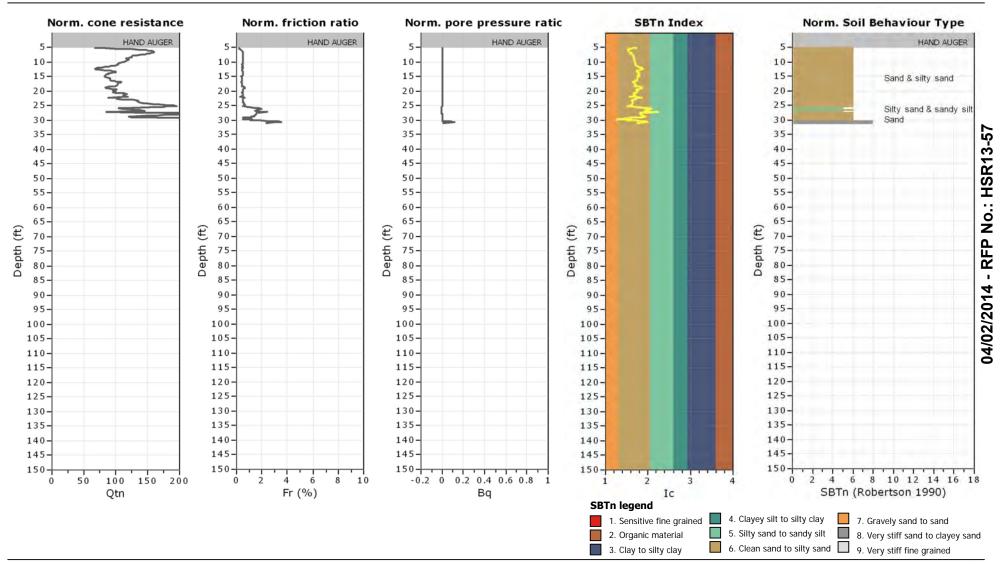
Location: Fresno-Bakersfield

CPT: S0094ACPT

Total depth: 31.17 ft

Surface Elevation: 260.74 ft

Coords: X:6356867.58, Y:2061952.03



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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

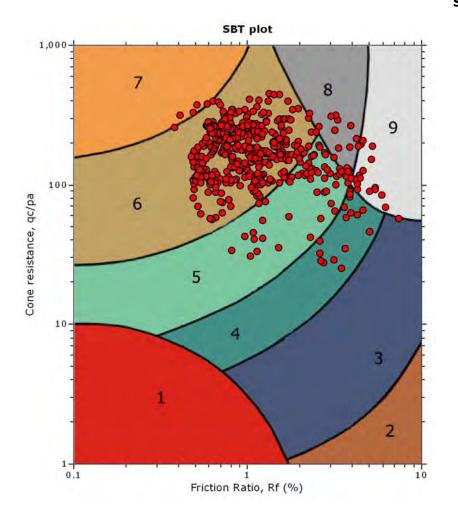
CPT: S0096ACPT

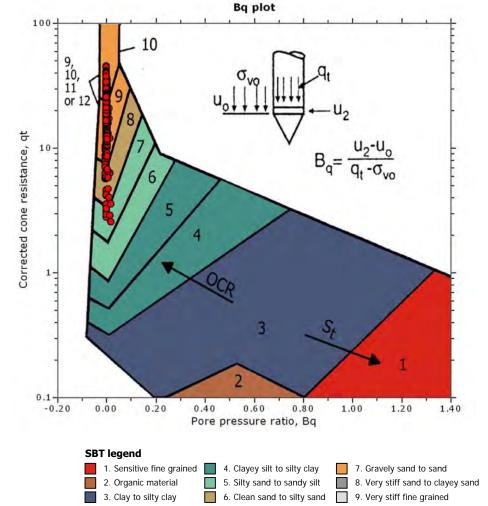
Total depth: 100.39 ft

Surface Elevation: 259.92 ft

Coords: X:6358805.99, Y:2059579.67

Cone Operator: Unknown





CPT: S0096ACPT

Total depth: 100.39 ft Surface Elevation: 259.92 ft

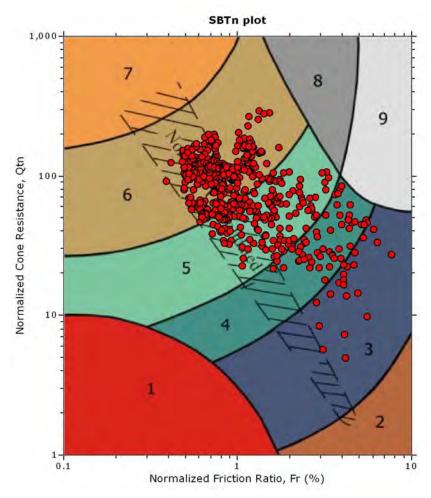
Coords: X:6358805.99, Y:2059579.67

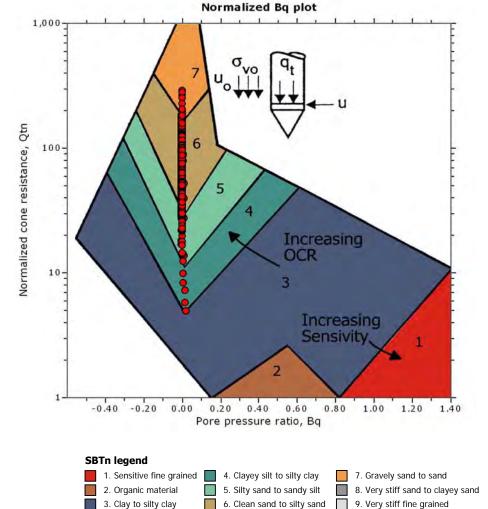
Cone Operator: Unknown

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

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**Project: California High-Speed Train** 

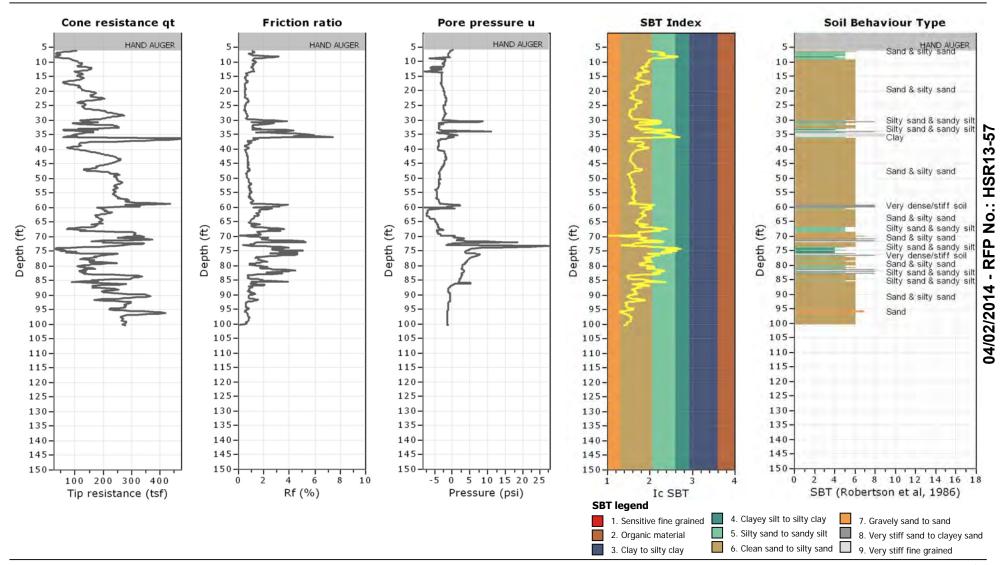
Location: Fresno-Bakersfield

CPT: S0096ACPT

Total depth: 100.39 ft

Surface Elevation: 259.92 ft

Coords: X:6358805.99, Y:2059579.67





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**Project: California High-Speed Train** 

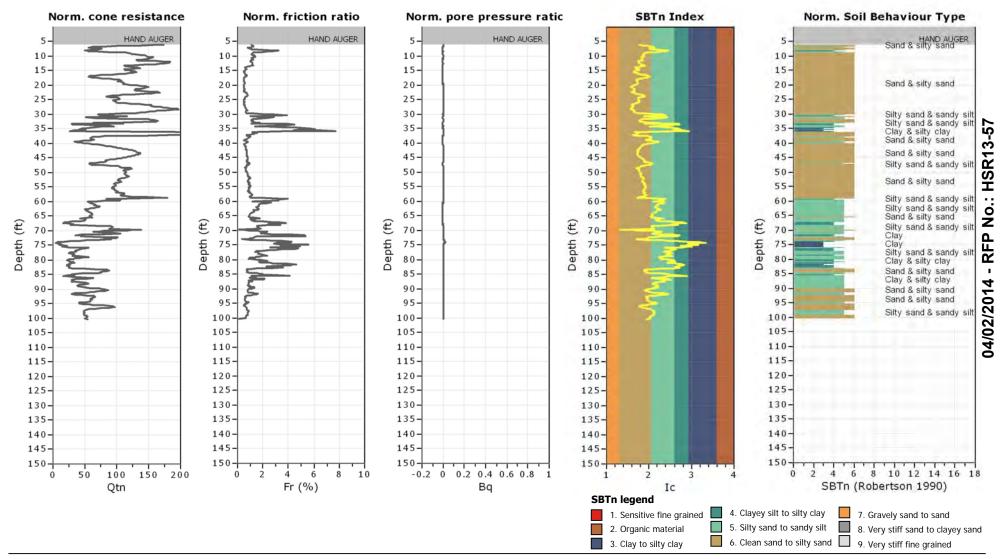
Location: Fresno-Bakersfield

CPT: S0096ACPT

Total depth: 100.39 ft

Surface Elevation: 259.92 ft

Coords: X:6358805.99, Y:2059579.67



SBT plot

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

1,000-

100-

0.1

Cone resistance, qc/pa

CPT: S0098BCPT

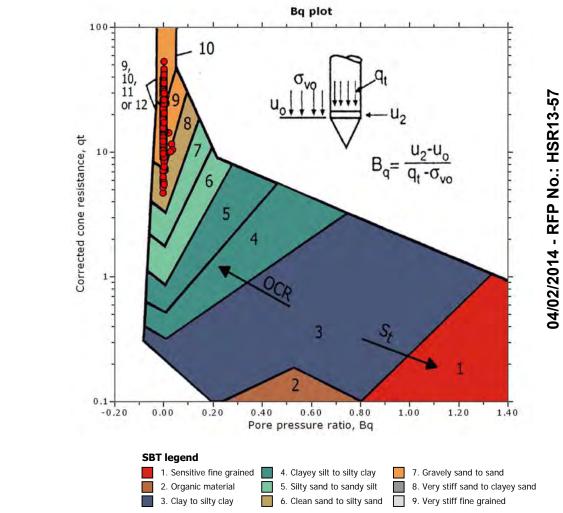
Total depth: 80.71 ft

Surface Elevation: 260.39 ft

Coords: X:6364274.34, Y:2057750.85

Cone Operator: Unknown

# SBT - Bq plots



Friction Ratio, Rf (%)

2

10

CPT: S0098BCPT

Total depth: 80.71 ft Surface Elevation: 260.39 ft

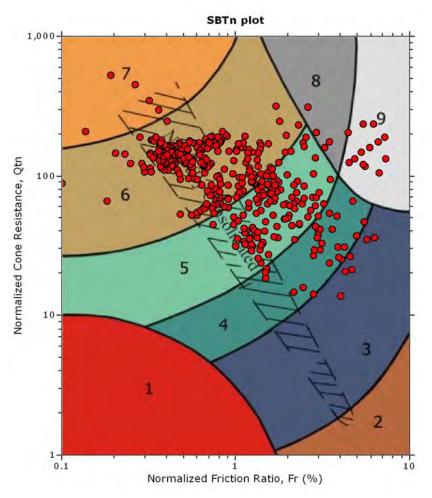
Coords: X:6364274.34, Y:2057750.85

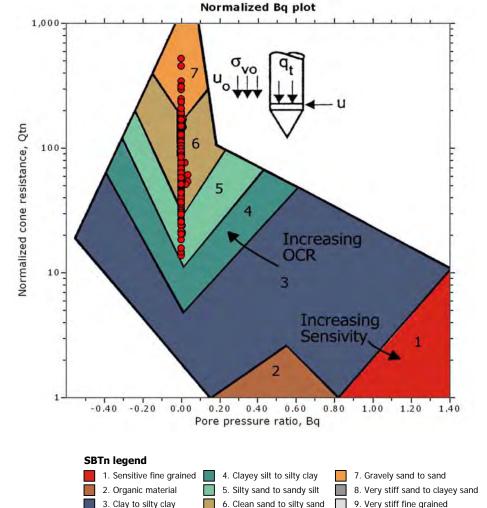
Cone Operator: Unknown

**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

URS HMM ARUP







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**Project: California High-Speed Train** 

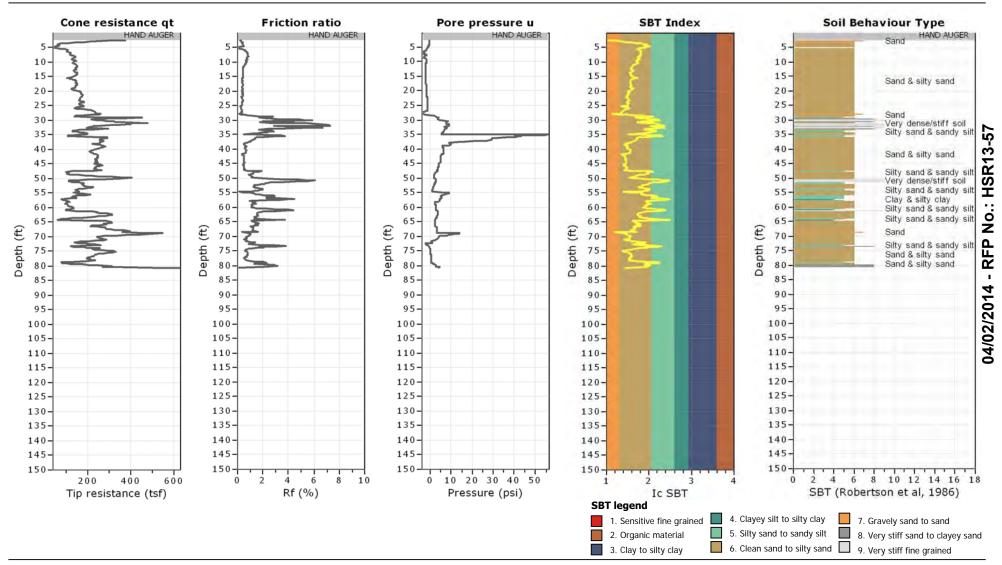
Location: Fresno-Bakersfield

CPT: S0098BCPT

Total depth: 80.71 ft

Surface Elevation: 260.39 ft

Coords: X:6364274.34, Y:2057750.85





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**Project: California High-Speed Train** 

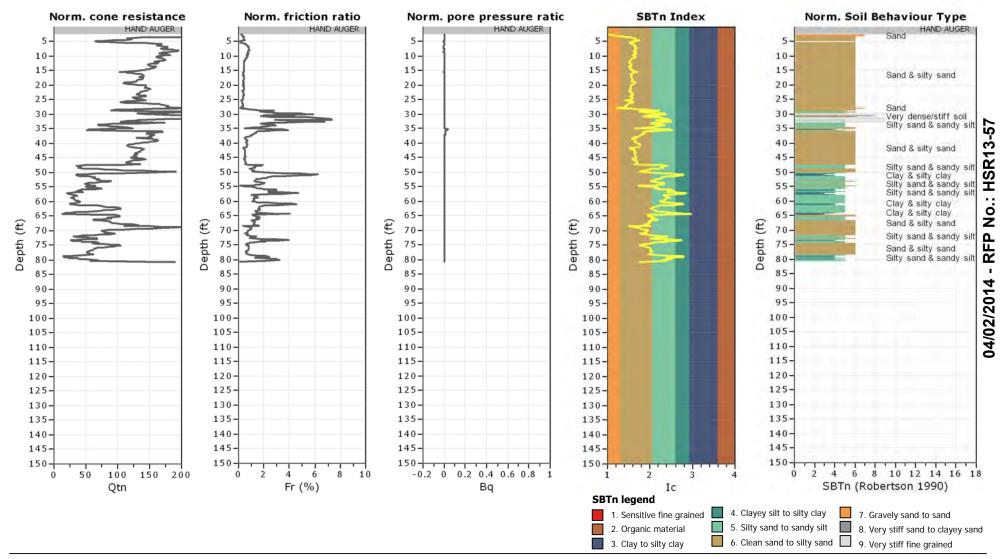
Location: Fresno-Bakersfield

CPT: S0098BCPT

Total depth: 80.71 ft

Surface Elevation: 260.39 ft

Coords: X:6364274.34, Y:2057750.85



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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

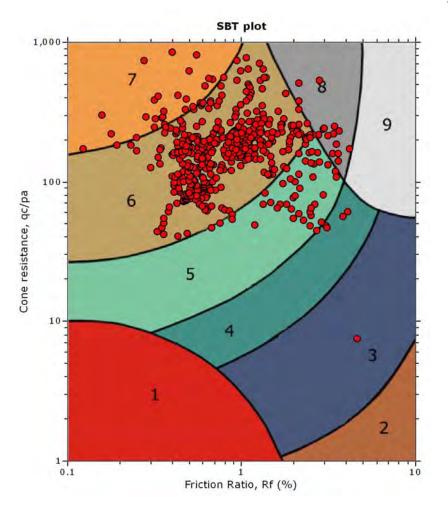
CPT: S0098CPT

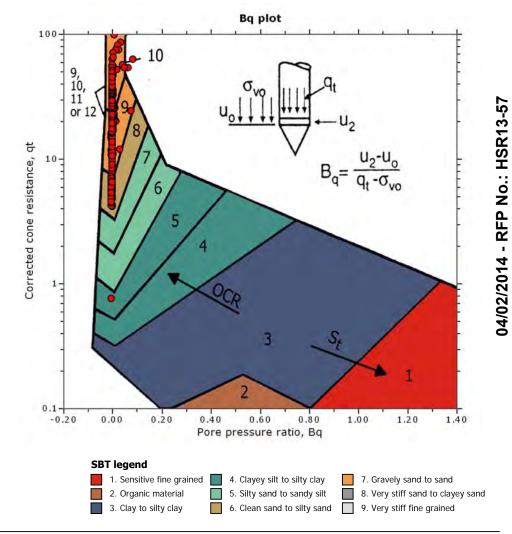
Total depth: 97.11 ft

Surface Elevation: 260.39 ft

Coords: X:6364993.75, Y:2056438.14

Cone Operator: Unknown





CPT: S0098CPT

Total depth: 97.11 ft Surface Elevation: 260.39 ft

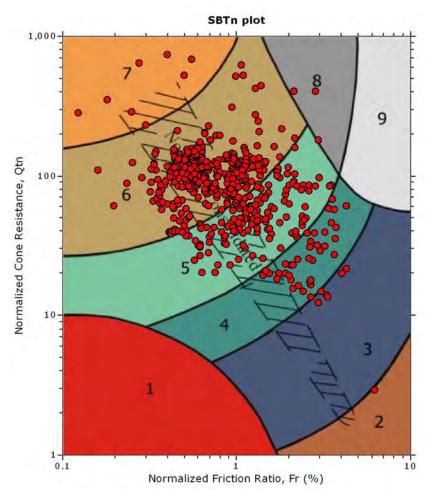
Coords: X:6364993.75, Y:2056438.14

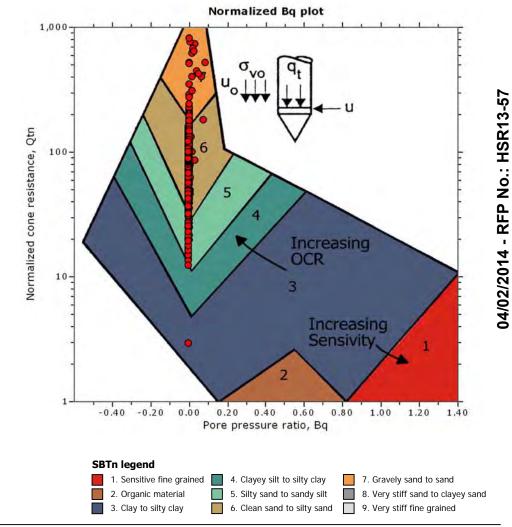
Cone Operator: Unknown

**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

URS HMM ARUP







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**Project: California High-Speed Train** 

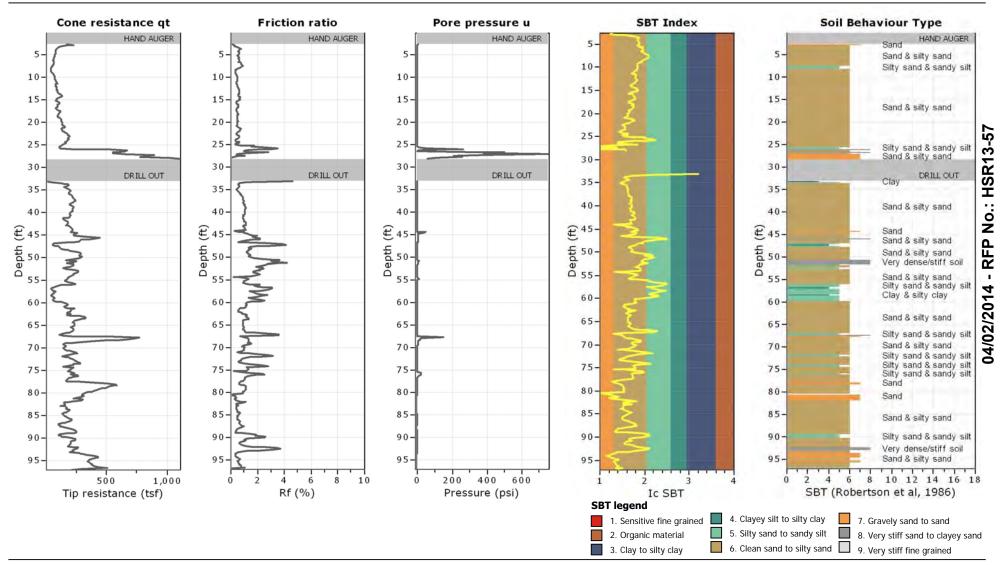
Location: Fresno-Bakersfield

CPT: S0098CPT

Total depth: 97.11 ft

Surface Elevation: 260.39 ft

Coords: X:6364993.75, Y:2056438.14





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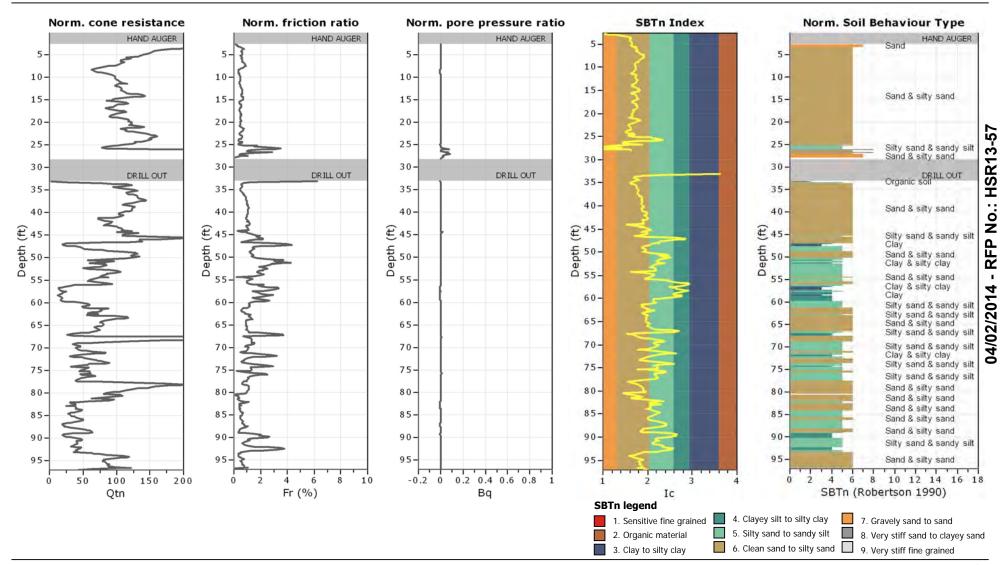
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0098CPT

Total depth: 97.11 ft

Surface Elevation: 260.39 ft Coords: X:6364993.75. Y:2056438.14



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

**CPT: S0099CPT** 

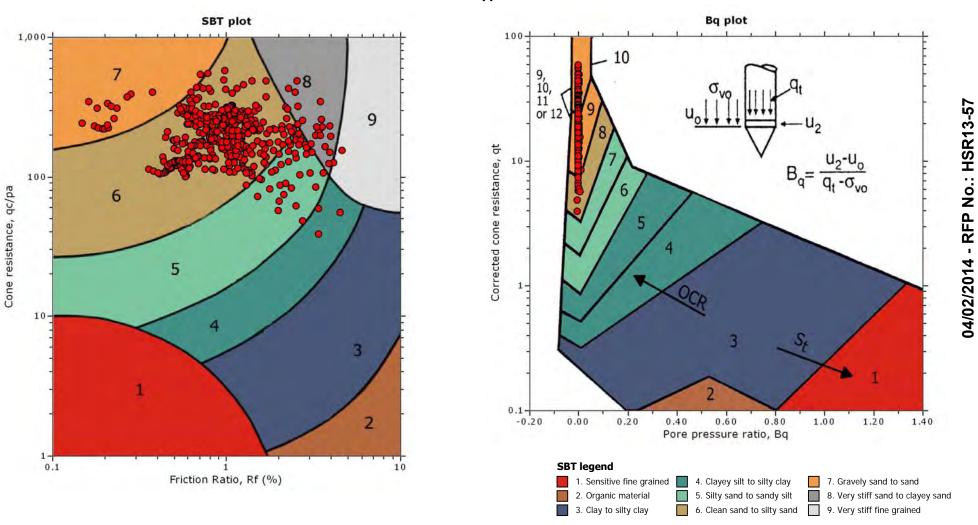
Total depth: 89.07 ft

Surface Elevation: 263.52 ft

Coords: X:6369577.37, Y:2056412.41

Cone Operator: Unknown

## SBT - Bq plots



CPT: S0099CPT

Total depth: 89.07 ft

Surface Elevation: 263.52 ft

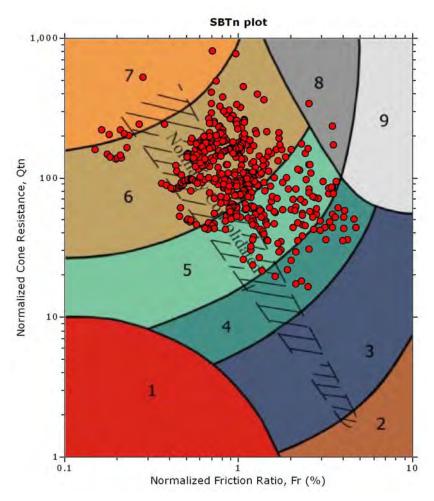
Coords: X:6369577.37, Y:2056412.41

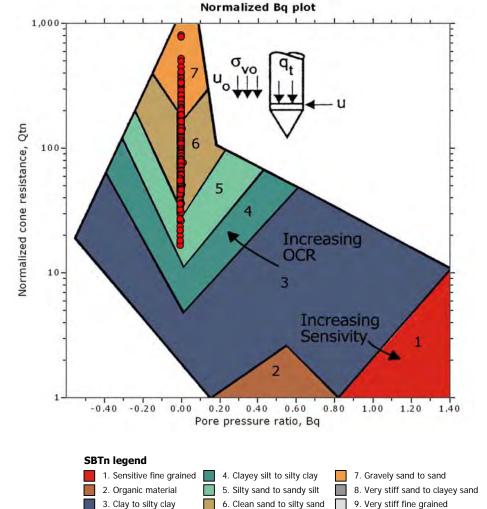
Cone Operator: Unknown

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

URS HMM ARUP







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**Project: California High-Speed Train** 

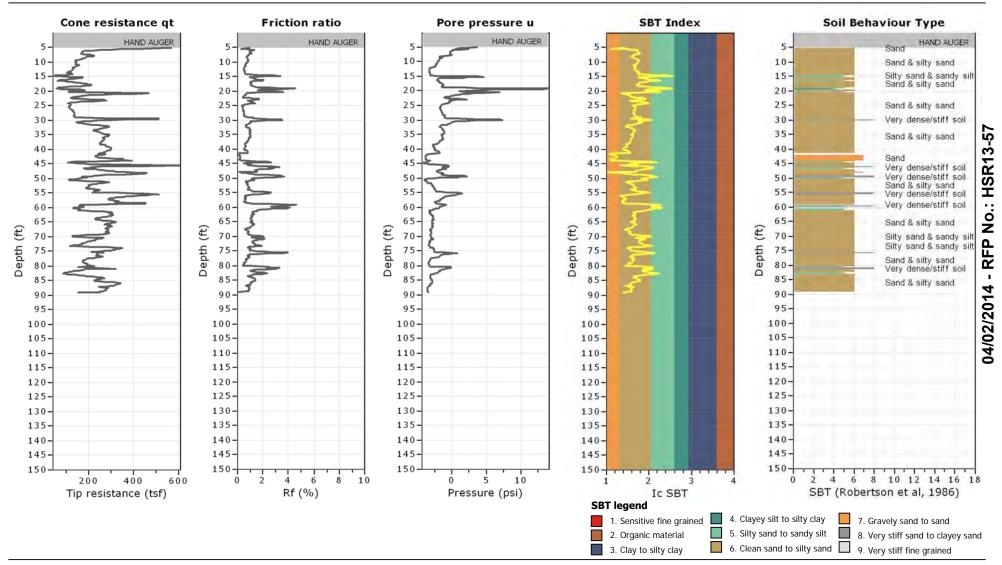
Location: Fresno-Bakersfield

CPT: S0099CPT

Total depth: 89.07 ft

Surface Elevation: 263.52 ft

Coords: X:6369577.37, Y:2056412.41





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**Project: California High-Speed Train** 

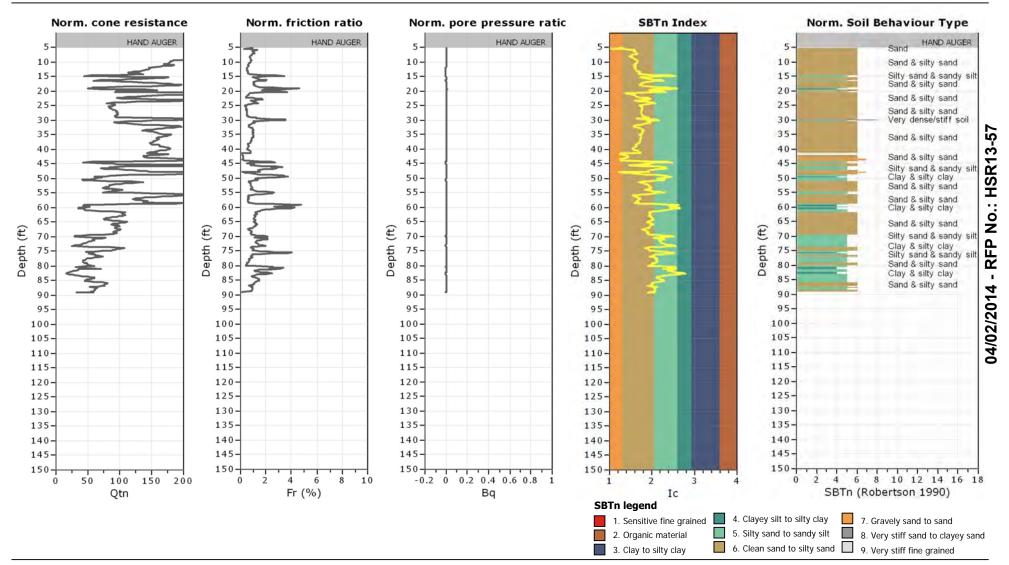
Location: Fresno-Bakersfield

CPT: S0099CPT

Total depth: 89.07 ft

Surface Elevation: 263.52 ft

Coords: X:6369577.37, Y:2056412.41



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

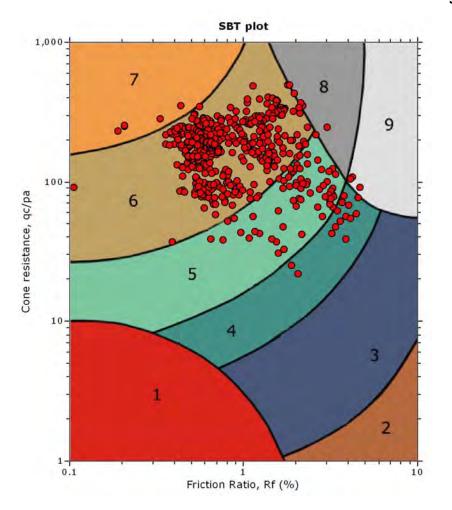
CPT: S0100CPT

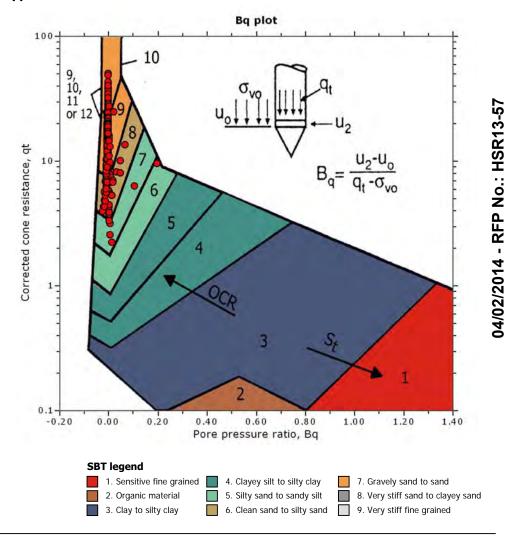
Total depth: 100.89 ft

Surface Elevation: 269.67 ft Coords: X:6374552.21, Y:2051310.64

Cone Operator: Unknown

## SBT - Bq plots



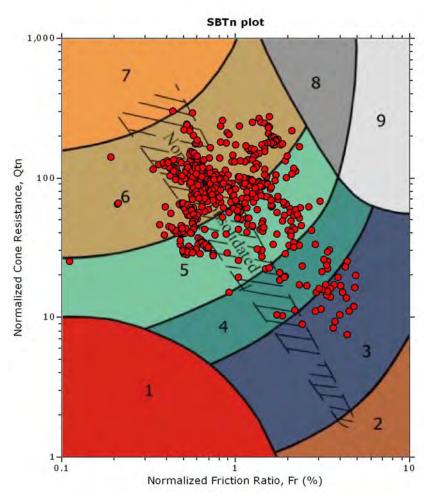


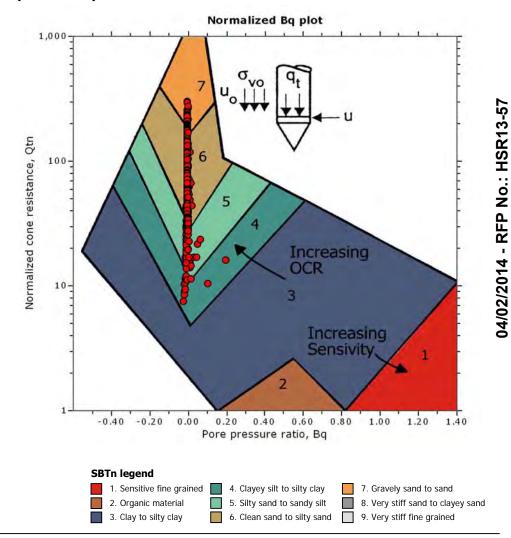
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 100.89 ft Surface Elevation: 269.67 ft Coords: X:6374552.21, Y:2051310.64

Cone Operator: Unknown







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**Project: California High-Speed Train** 

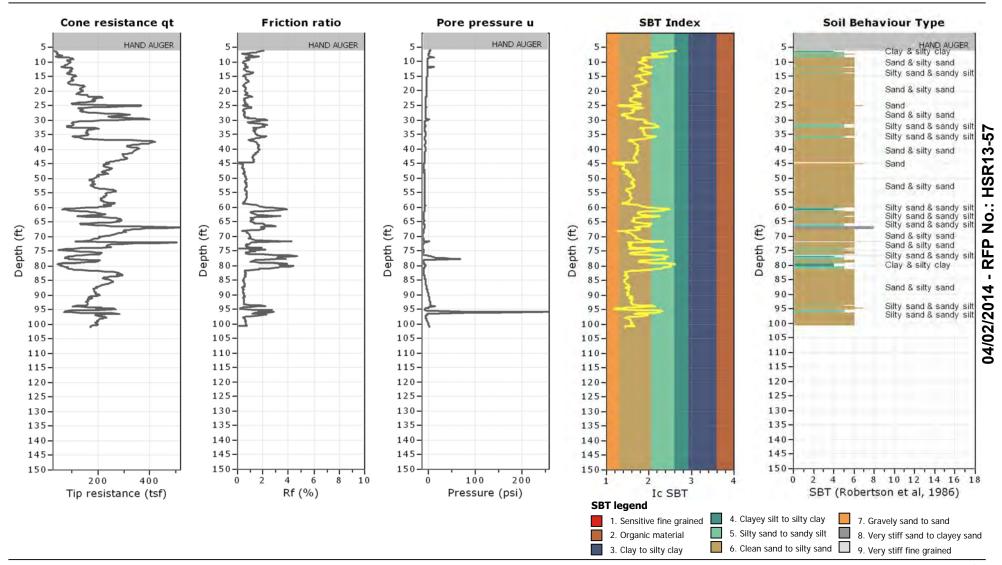
Location: Fresno-Bakersfield

CPT: S0100CPT

Total depth: 100.89 ft

Surface Elevation: 269.67 ft

Coords: X:6374552.21, Y:2051310.64





www.hsr.ca.gov

**Project: California High-Speed Train** 

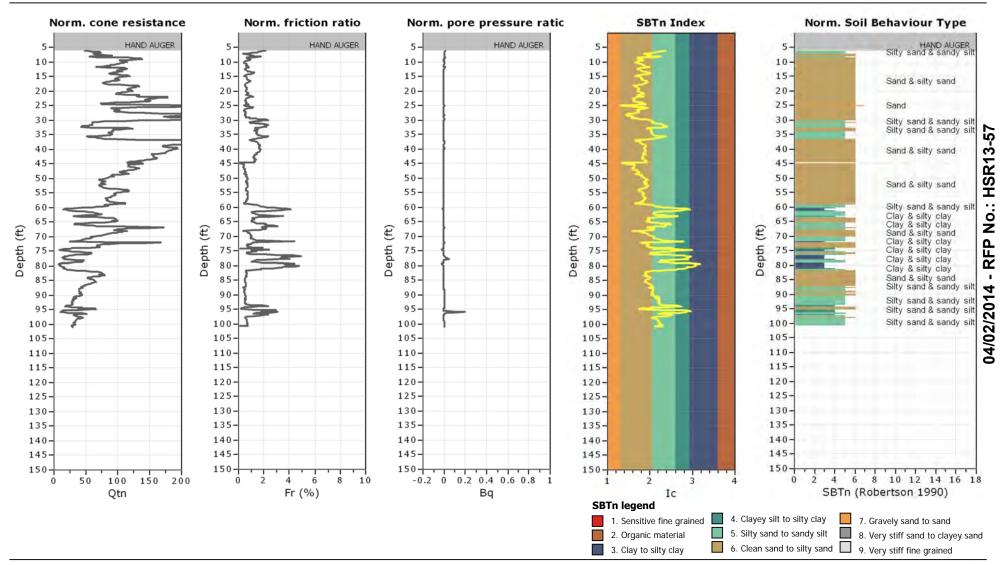
Location: Fresno-Bakersfield

CPT: S0100CPT

Total depth: 100.89 ft

Surface Elevation: 269.67 ft

Coords: X:6374552.21, Y:2051310.64



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0102CPT

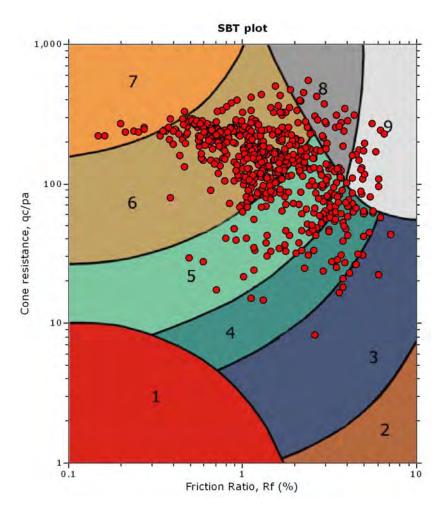
Total depth: 114.99 ft

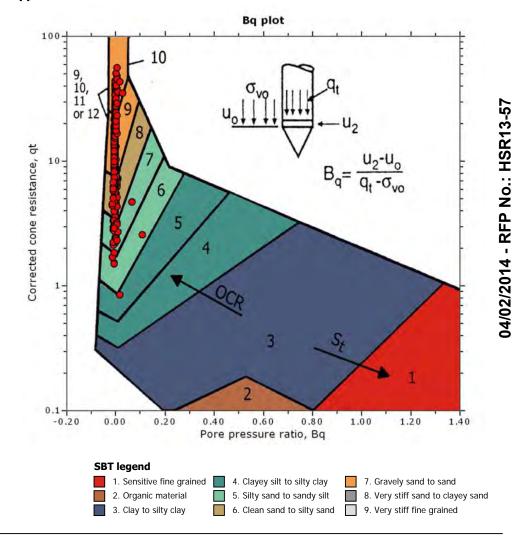
Surface Elevation: 270.56 ft

Coords: X:6374590.68, Y:2048949.14

Cone Operator: Unknown

## SBT - Bq plots

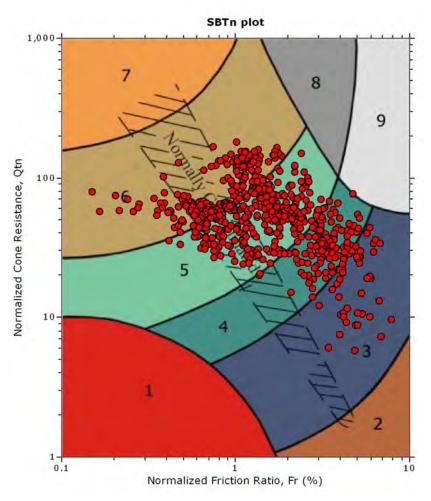


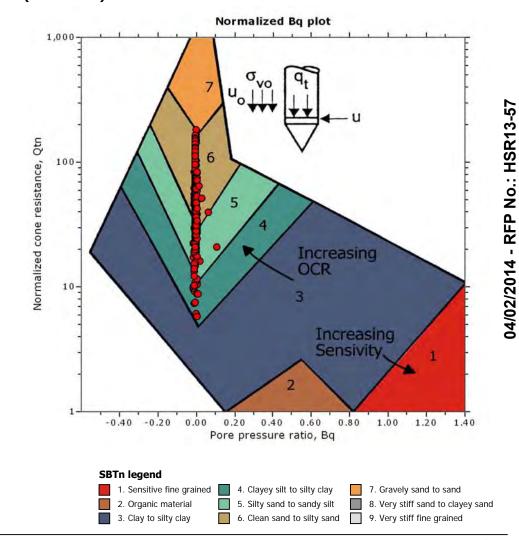




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

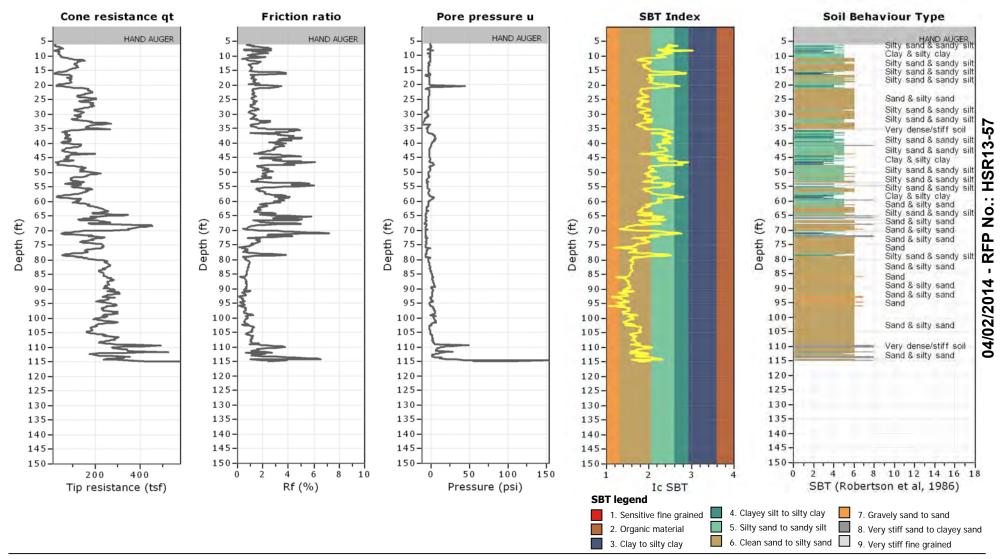
Location: Fresno-Bakersfield

CPT: S0102CPT

Total depth: 114.99 ft

Surface Elevation: 270.56 ft

Coords: X:6374590.68, Y:2048949.14





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**Project: California High-Speed Train** 

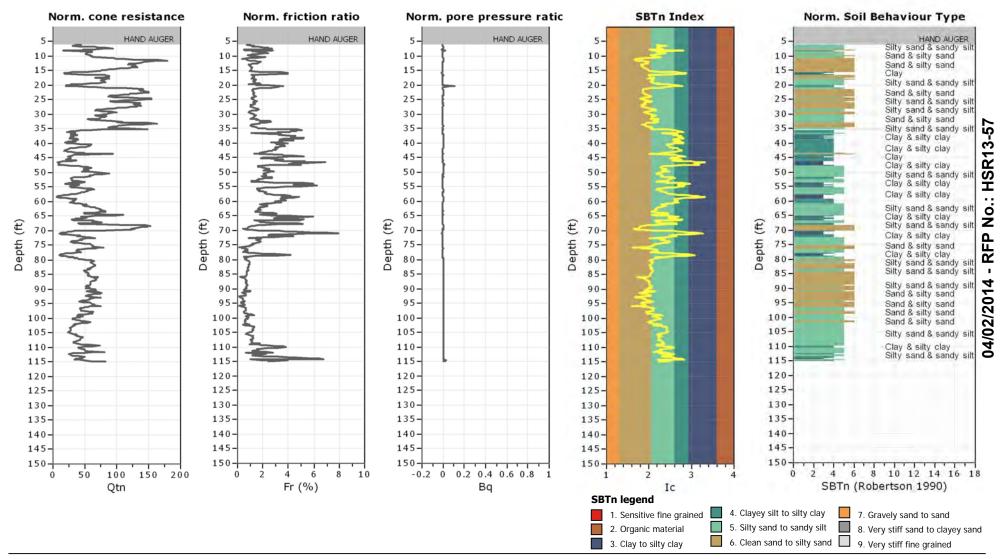
Location: Fresno-Bakersfield

CPT: S0102CPT

Total depth: 114.99 ft

Surface Elevation: 270.56 ft

Coords: X:6374590.68, Y:2048949.14



SBT plot

www.hsr.ca.gov

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

1,000-

100-

0.1

Cone resistance, qc/pa

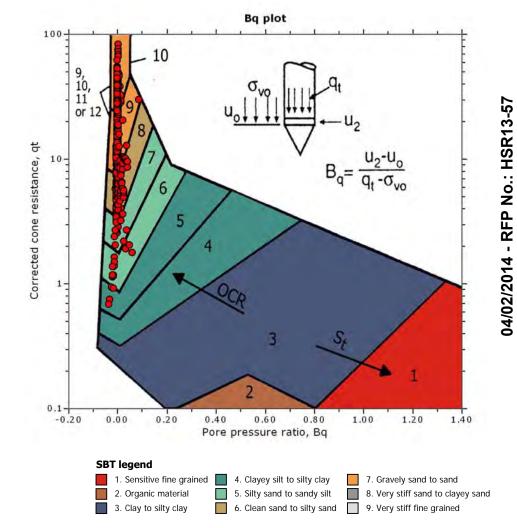
CPT: S0105BCPT

Total depth: 143.54 ft

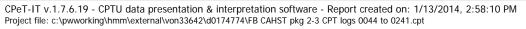
Surface Elevation: 267.72 ft

Coords: X:6374588.41, Y:2046785.94

Cone Operator: Unknown







Friction Ratio, Rf (%)

2

10

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

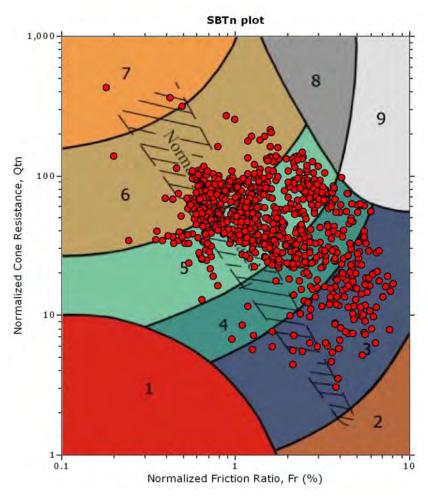
CPT: S0105BCPT

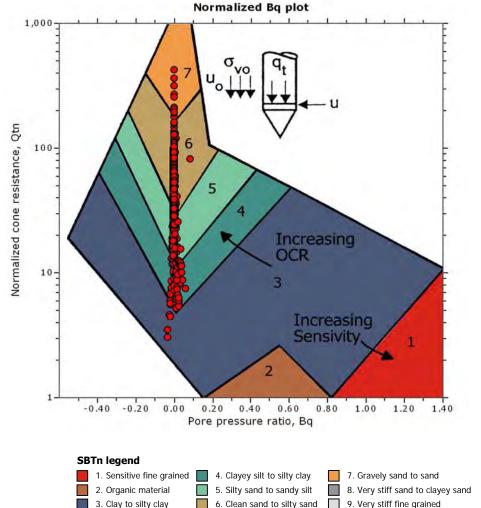
Total depth: 143.54 ft

Surface Elevation: 267.72 ft

Coords: X:6374588.41, Y:2046785.94

Cone Operator: Unknown







**Project: California High-Speed Train** 

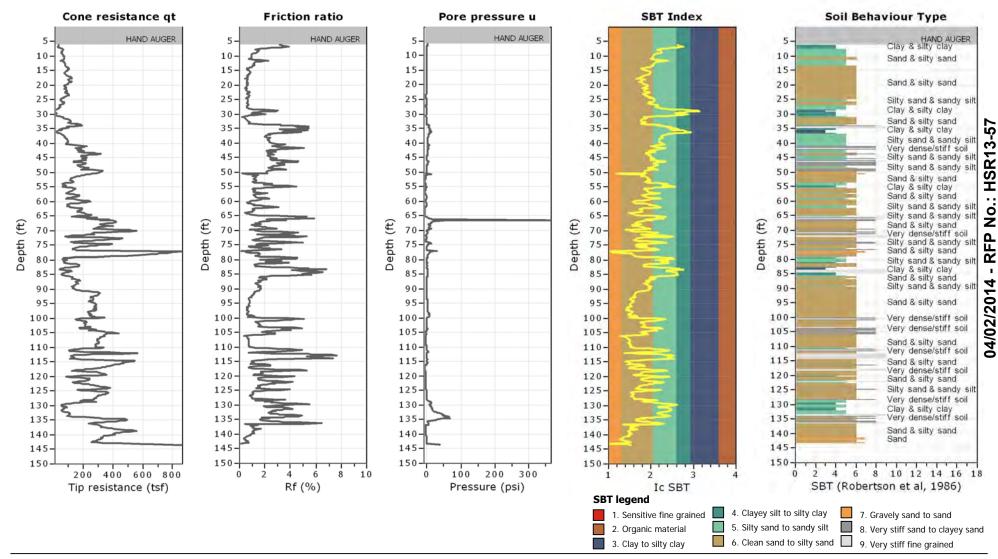
Location: Fresno-Bakersfield

CPT: S0105BCPT

Total depth: 143.54 ft

Surface Elevation: 267.72 ft

Coords: X:6374588.41, Y:2046785.94





www.hsr.ca.gov

**Project: California High-Speed Train** 

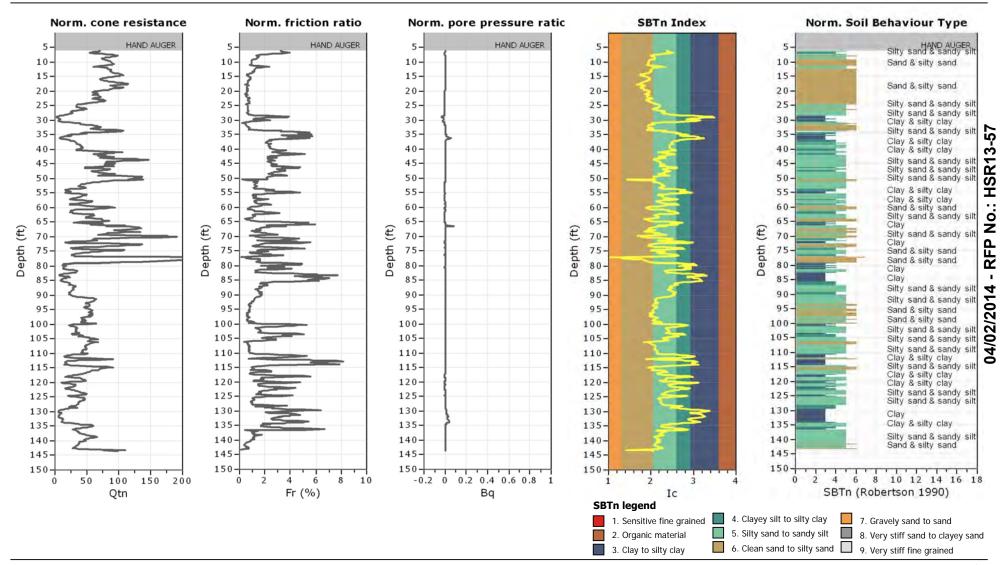
Location: Fresno-Bakersfield

CPT: S0105BCPT

Total depth: 143.54 ft

Surface Elevation: 267.72 ft

Coords: X:6374588.41, Y:2046785.94



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

**CPT: S0186CPT** 

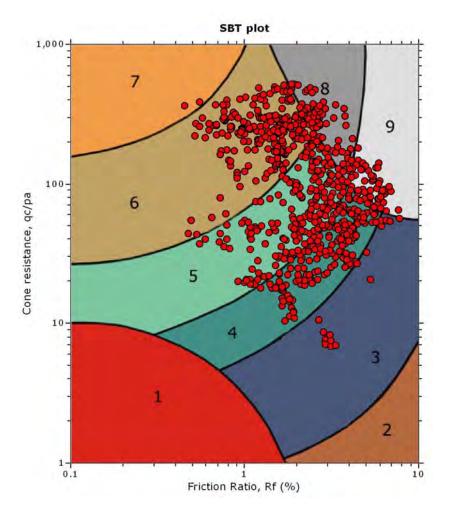
Total depth: 130.25 ft

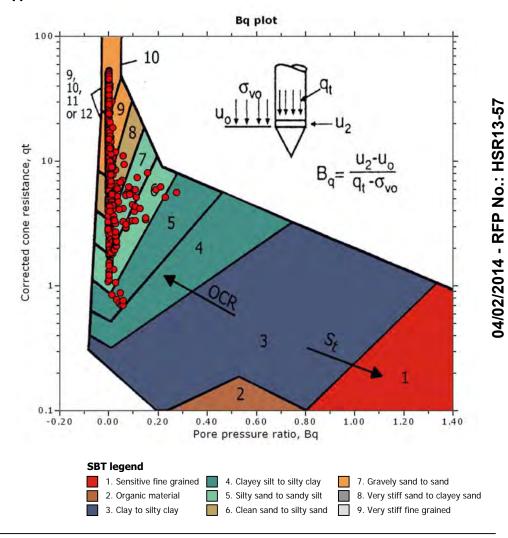
Surface Elevation: 192.71 ft

Coords: X:6403204.06, Y:1912294.67

Cone Operator: Unknown

## SBT - Bq plots



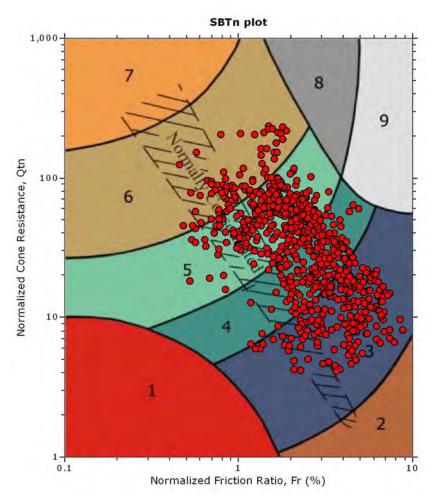


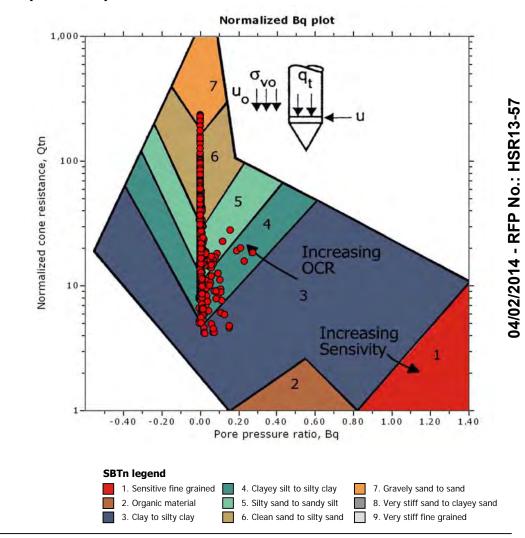
# URS HMM ARUP

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

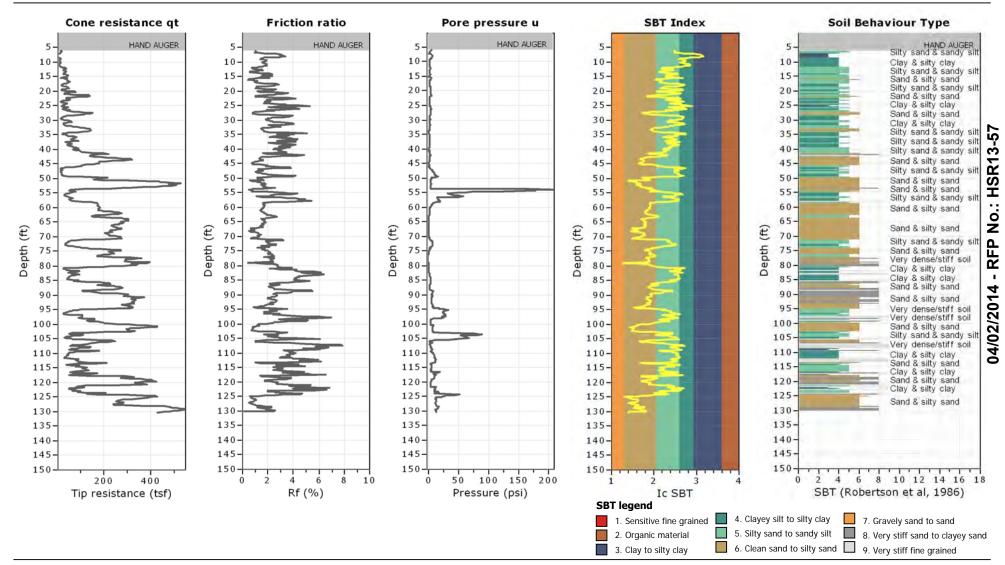
Location: Fresno-Bakersfield

CPT: S0186CPT

Total depth: 130.25 ft

Surface Elevation: 192.71 ft

Coords: X:6403204.06, Y:1912294.67





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**Project: California High-Speed Train** 

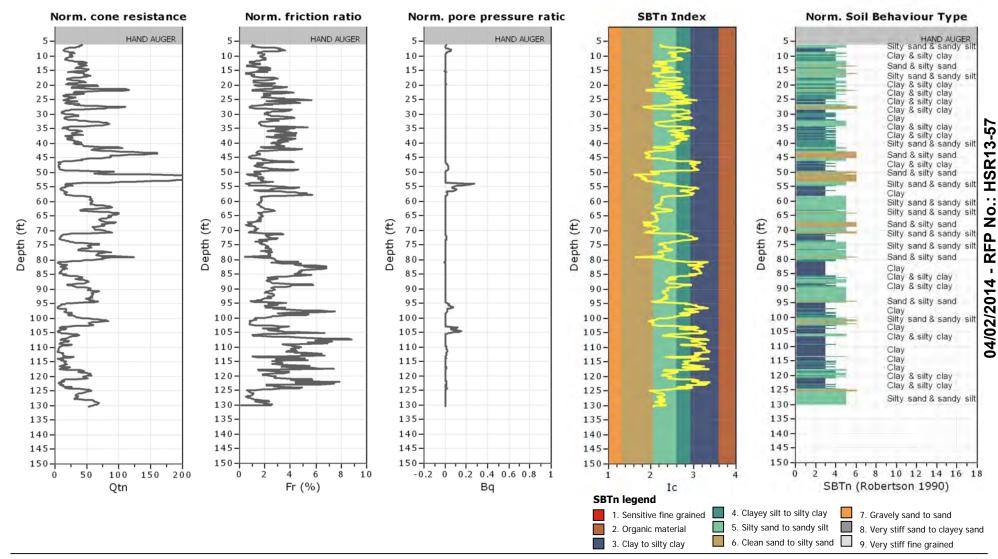
Location: Fresno-Bakersfield

CPT: S0186CPT

Total depth: 130.25 ft

Surface Elevation: 192.71 ft

Coords: X:6403204.06, Y:1912294.67



**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

1,000-

100-

0.1

Cone resistance, qc/pa

CPT: S0188CPT

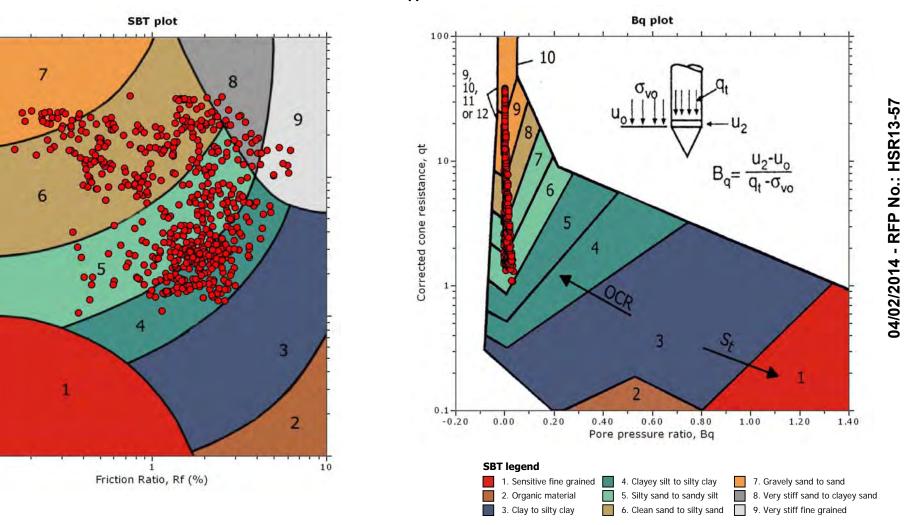
Total depth: 96.95 ft

Surface Elevation: 193.65 ft

Coords: X:6404308.59, Y:1907315.69

Cone Operator: Unknown

## SBT - Bq plots





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

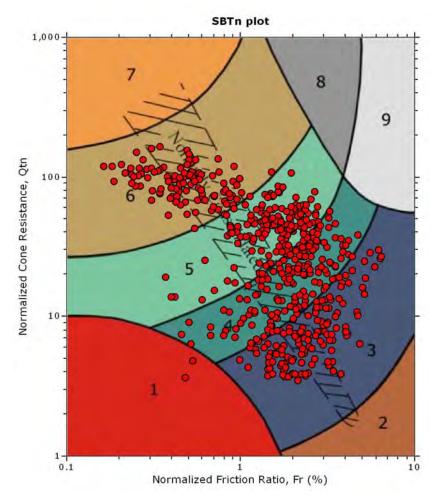
#### CPT: S0188CPT

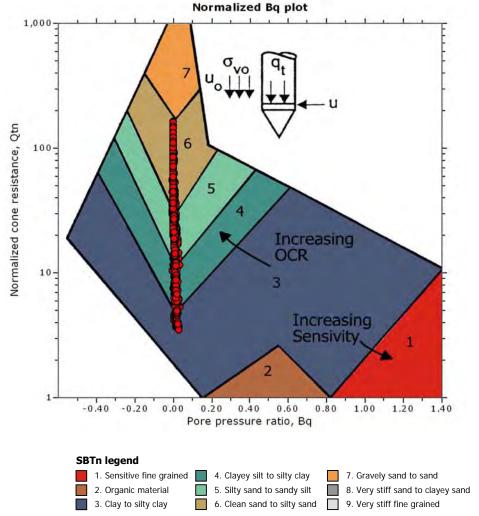
Total depth: 96.95 ft

Surface Elevation: 193.65 ft

Coords: X:6404308.59, Y:1907315.69

Cone Operator: Unknown







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**Project: California High-Speed Train** 

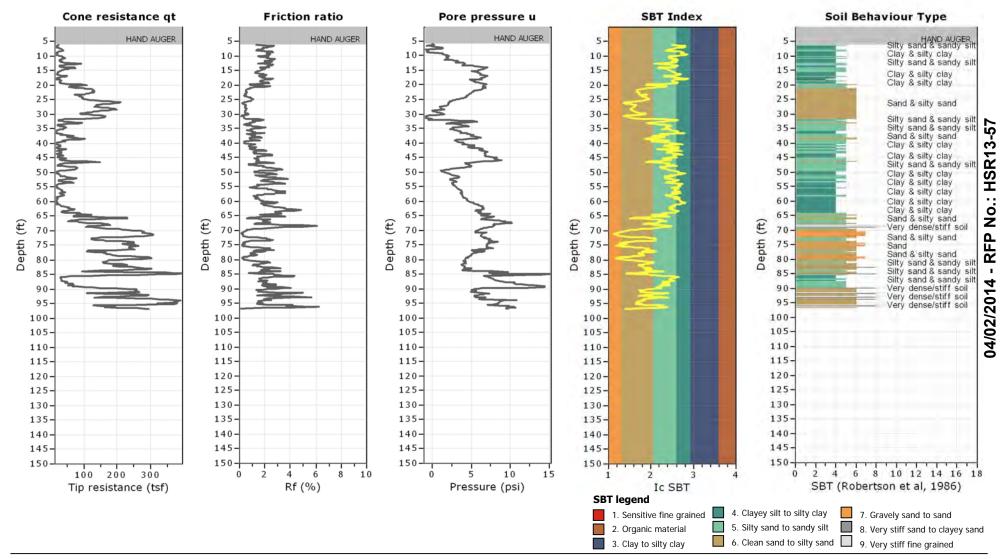
Location: Fresno-Bakersfield

CPT: S0188CPT

Total depth: 96.95 ft

Surface Elevation: 193.65 ft

Coords: X:6404308.59, Y:1907315.69





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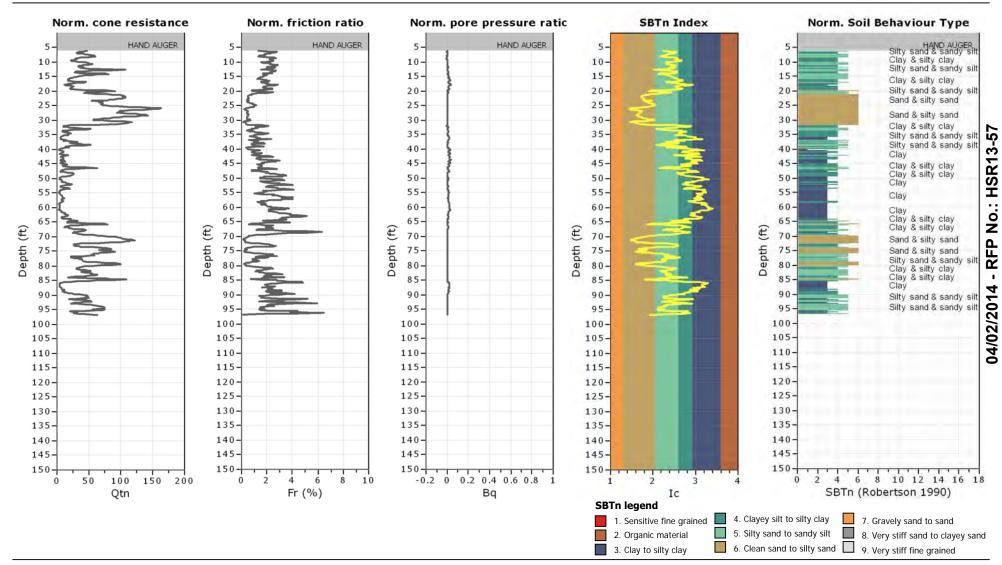
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0188CPT

Total depth: 96.95 ft

Surface Elevation: 193.65 ft Coords: X:6404308.59, Y:1907315.69



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

**CPT: S0190CPT** 

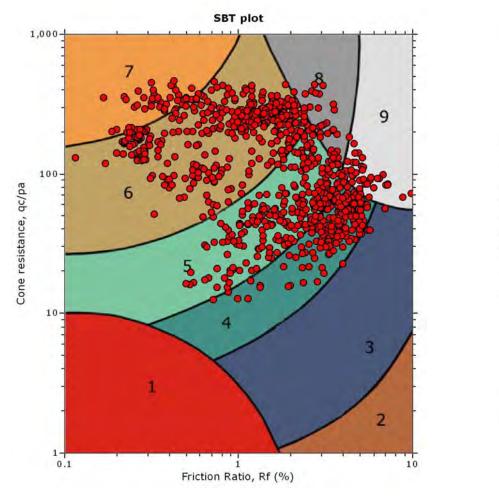
Total depth: 150.43 ft

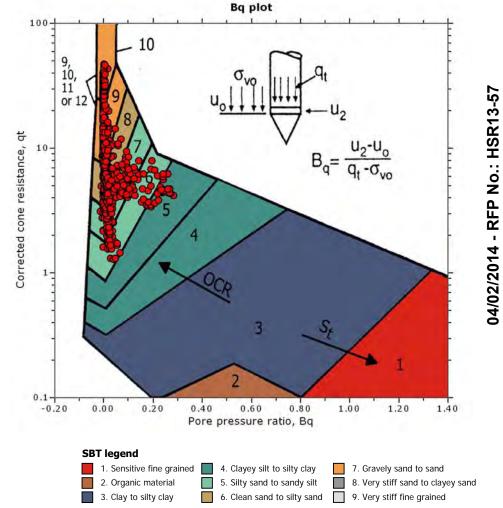
Surface Elevation: 194.00 ft

Coords: X:6406412.53, Y:1903710.64

Cone Operator: Unknown

## SBT - Bq plots



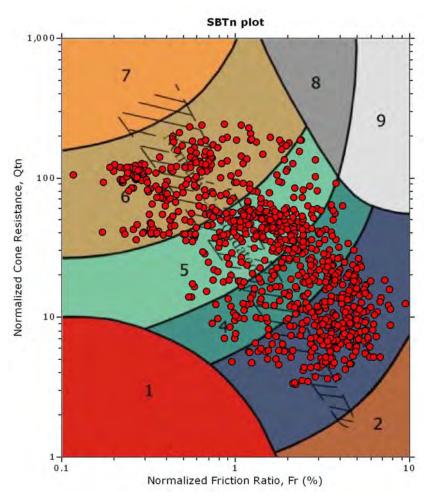


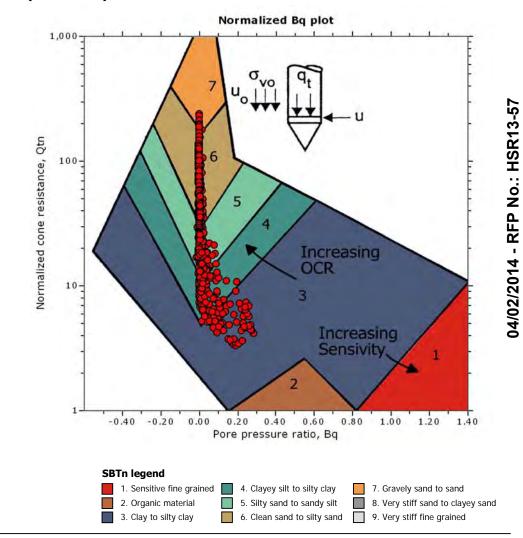
## URS HMM ARUP

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







**Project: California High-Speed Train** 

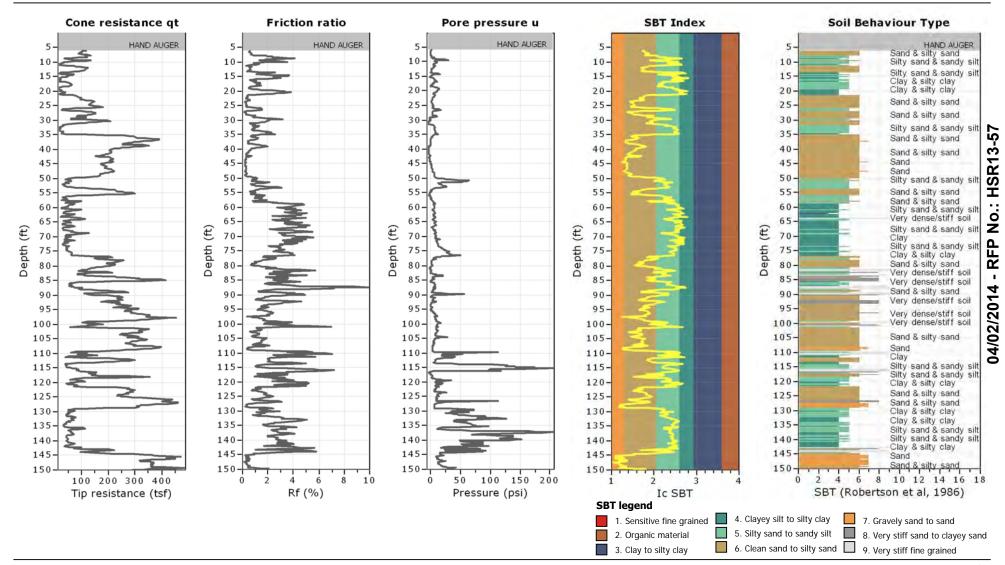
Location: Fresno-Bakersfield

CPT: S0190CPT

Total depth: 150.43 ft

Surface Elevation: 194.00 ft

Coords: X:6406412.53, Y:1903710.64





**Project: California High-Speed Train** 

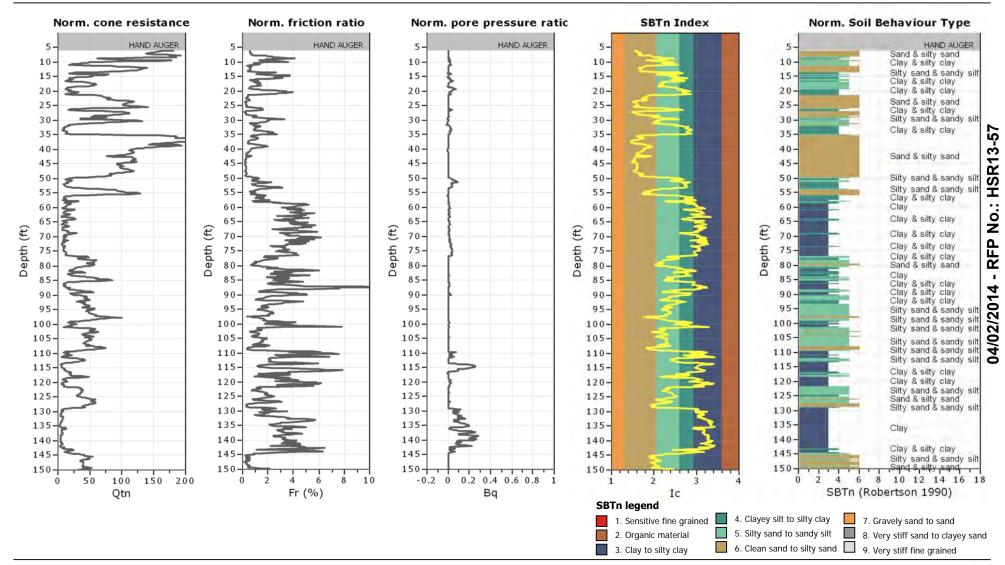
Location: Fresno-Bakersfield

CPT: S0190CPT

Total depth: 150.43 ft

Surface Elevation: 194.00 ft

Coords: X:6406412.53, Y:1903710.64





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

**CPT: S0191CPT** 

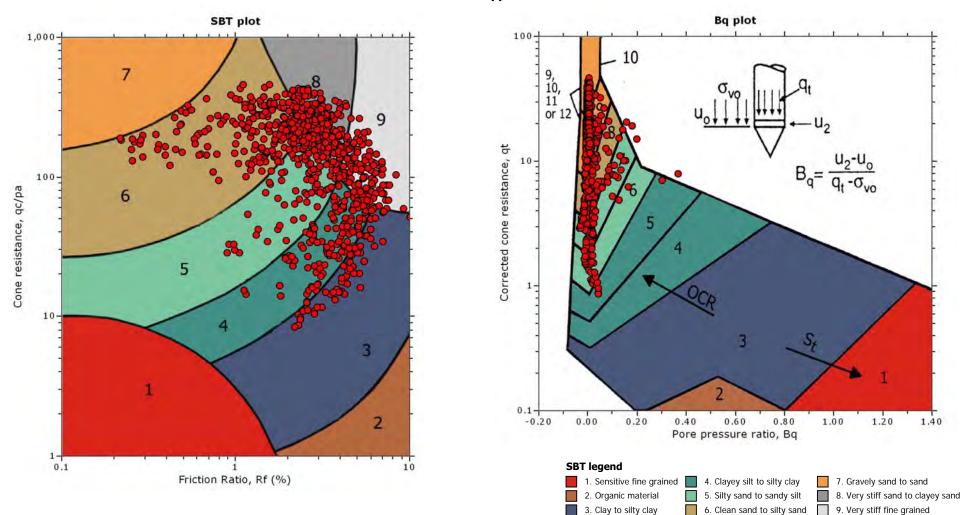
Total depth: 150.26 ft

Surface Elevation: 194.37 ft

Coords: X:6407615.56, Y:1902004.73

Cone Operator: Unknown

## SBT - Bq plots



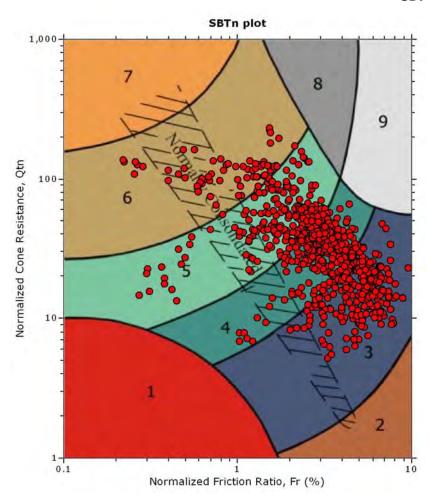
1.40

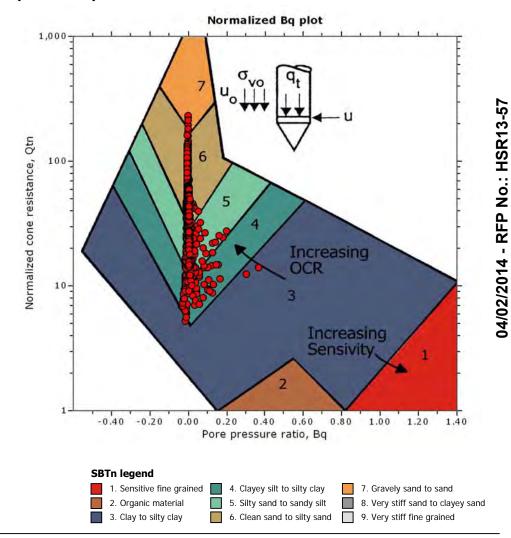
1.20

04/02/2014 - RFP No.: HSR13-57

**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 





Total depth: 150.26 ft

Surface Elevation: 194.37 ft

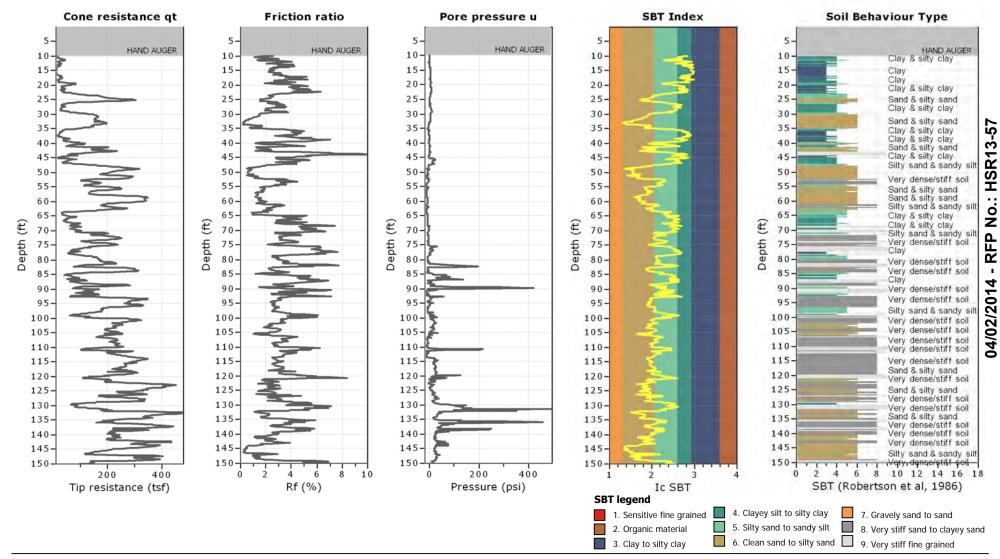
Coords: X:6407615.56, Y:1902004.73

Cone Operator: Unknown

CPT: S0191CPT

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield





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**Project: California High-Speed Train** 

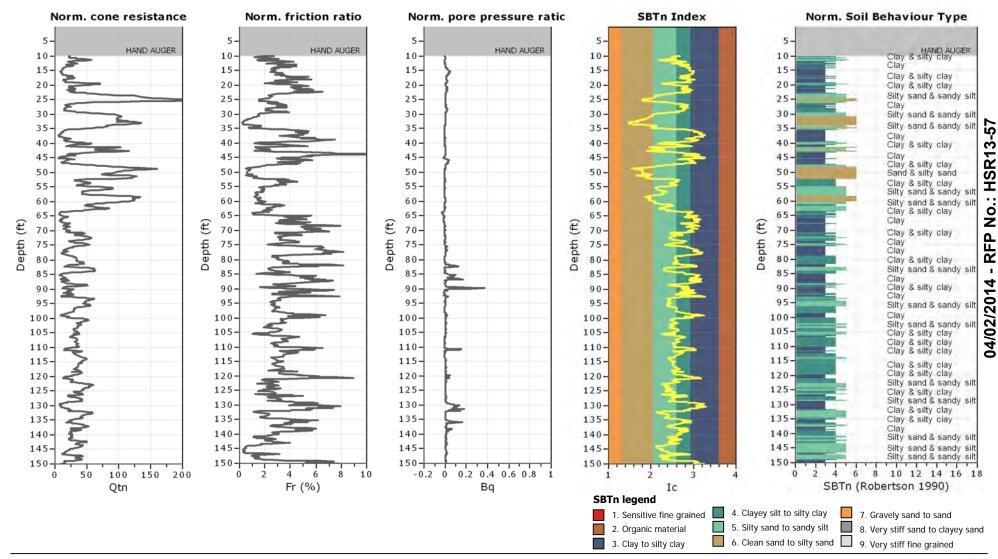
Location: Fresno-Bakersfield

CPT: S0191CPT

Total depth: 150.26 ft

Surface Elevation: 194.37 ft

Coords: X:6407615.56, Y:1902004.73



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

**CPT: S0192CPT** 

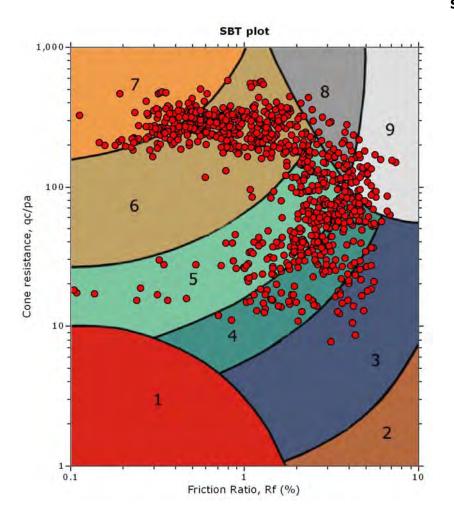
Total depth: 157.32 ft

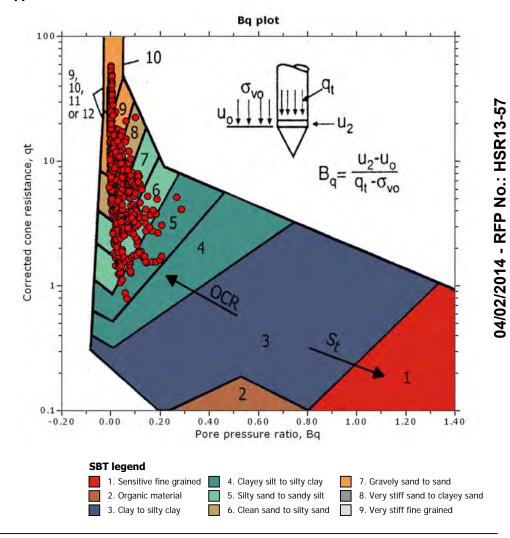
Surface Elevation: 194.35 ft

Coords: X:6408225.45, Y:1900749.12

Cone Operator: Unknown

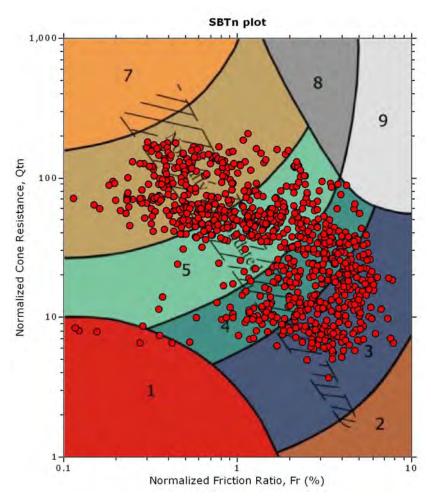
## SBT - Bq plots

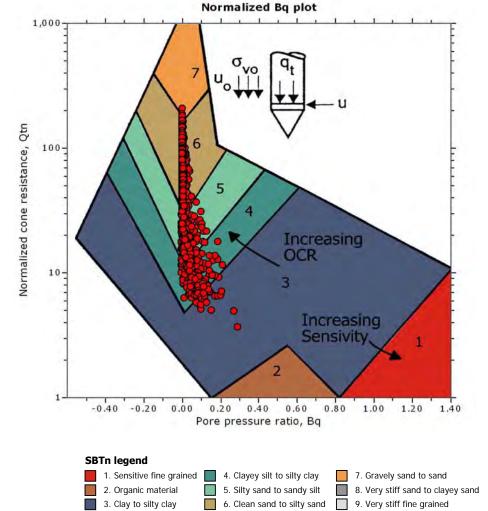




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







**Project: California High-Speed Train** 

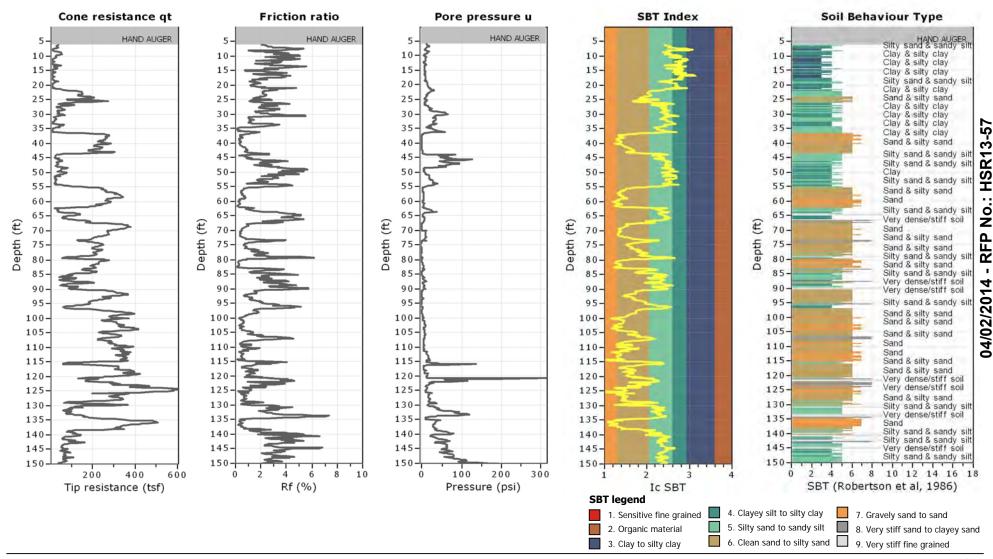
Location: Fresno-Bakersfield

CPT: S0192CPT

Total depth: 157.32 ft

Surface Elevation: 194.35 ft

Coords: X:6408225.45, Y:1900749.12





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**Project: California High-Speed Train** 

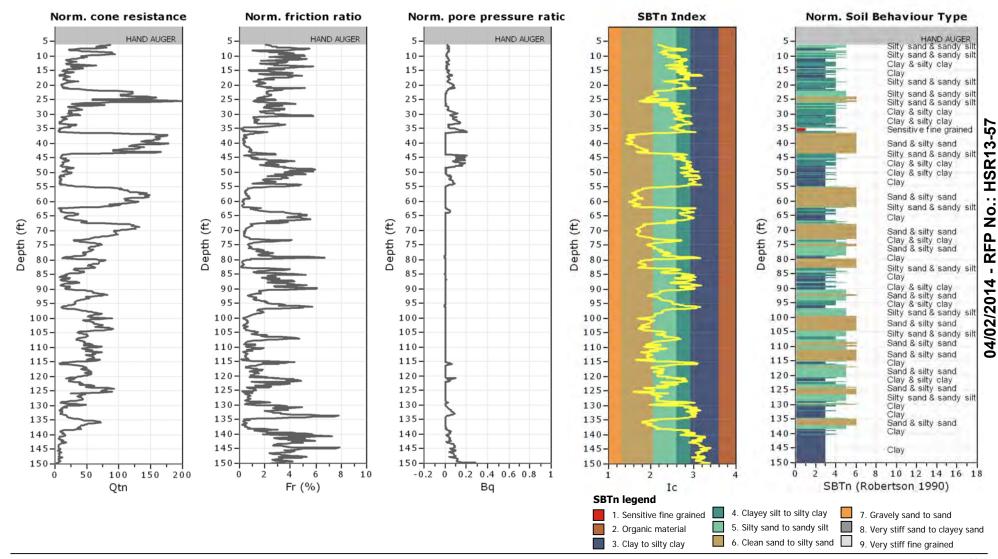
Location: Fresno-Bakersfield

CPT: S0192CPT

Total depth: 157.32 ft

Surface Elevation: 194.35 ft

Coords: X:6408225.45, Y:1900749.12



Project: California High-Speed Train

Location: Fresno-Bakersfield

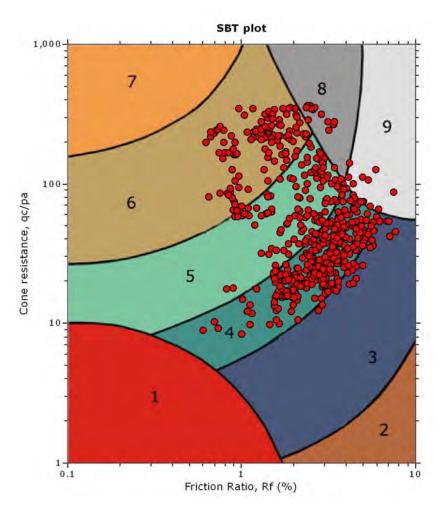
**CPT: S0193CPT** 

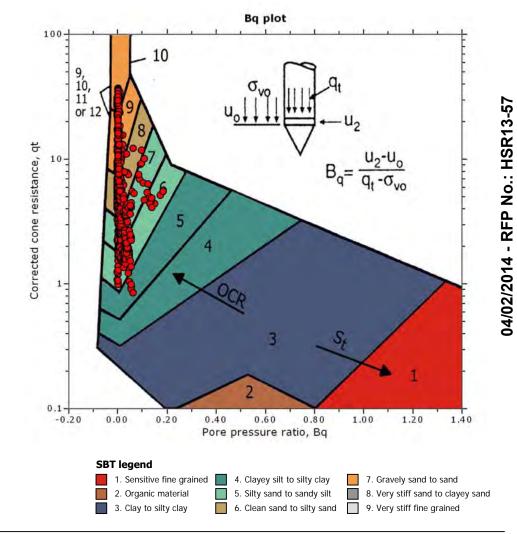
Total depth: 100.39 ft

Surface Elevation: 196.88 ft

Coords: X:6409049.18, Y:1899390.81

Cone Operator: Unknown

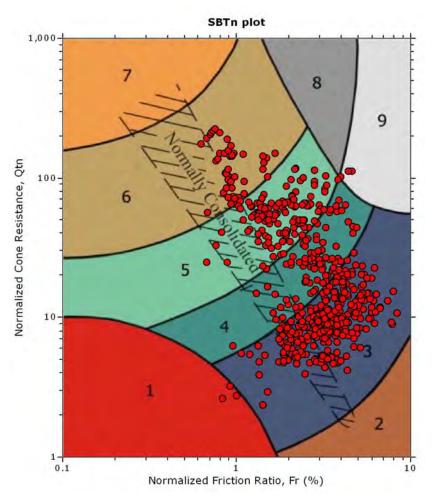


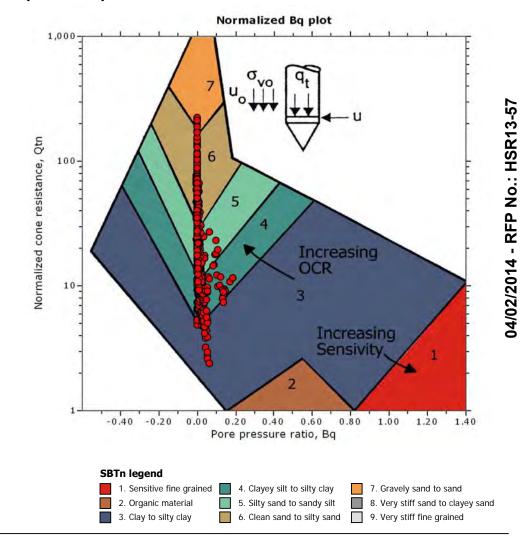




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

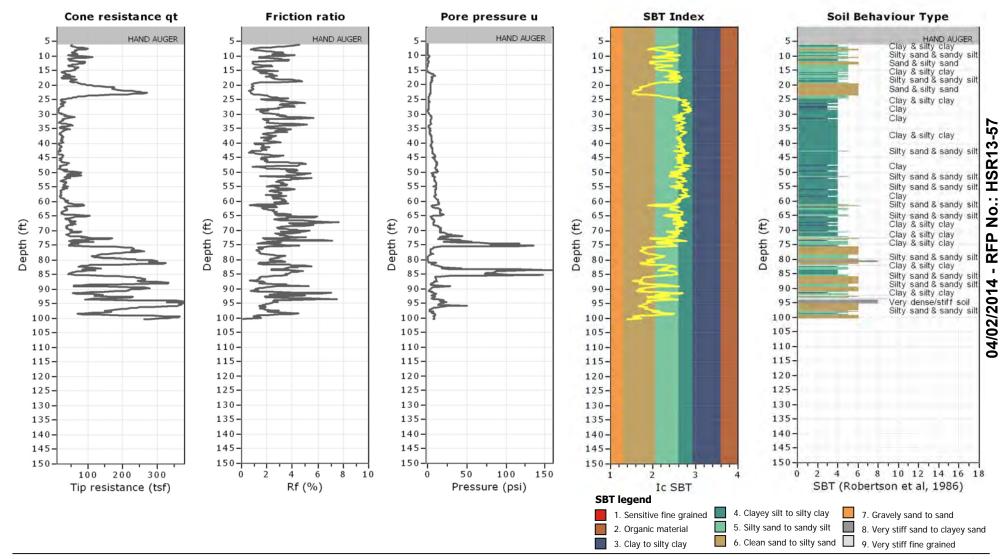
Location: Fresno-Bakersfield

CPT: S0193CPT

Total depth: 100.39 ft

Surface Elevation: 196.88 ft

Coords: X:6409049.18, Y:1899390.81





www.hsr.ca.gov

**Project: California High-Speed Train** 

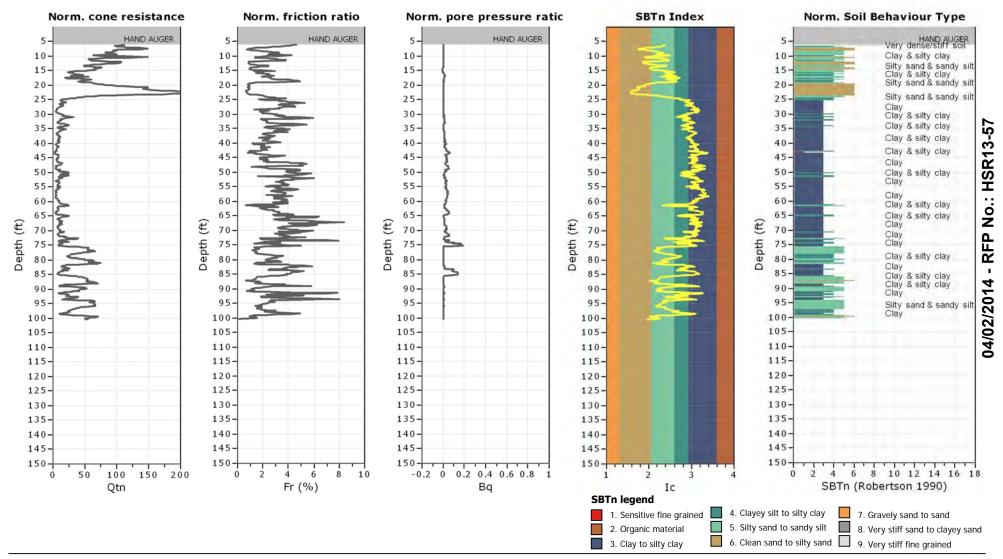
Location: Fresno-Bakersfield

CPT: S0193CPT

Total depth: 100.39 ft

Surface Elevation: 196.88 ft

Coords: X:6409049.18, Y:1899390.81



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

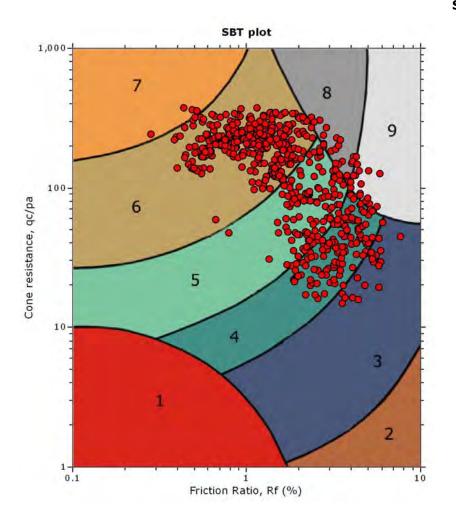
**CPT: S0194CPT** 

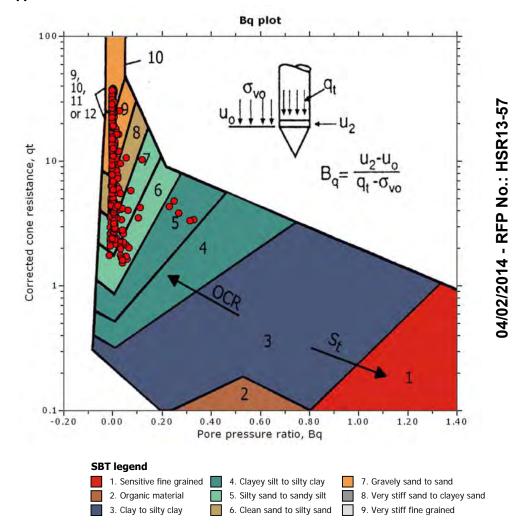
Total depth: 116.63 ft

Surface Elevation: 198.28 ft

Coords: X:6409444.68, Y:1898768.72

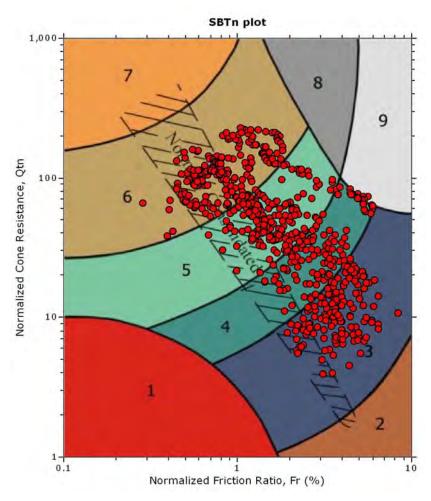
Cone Operator: Unknown

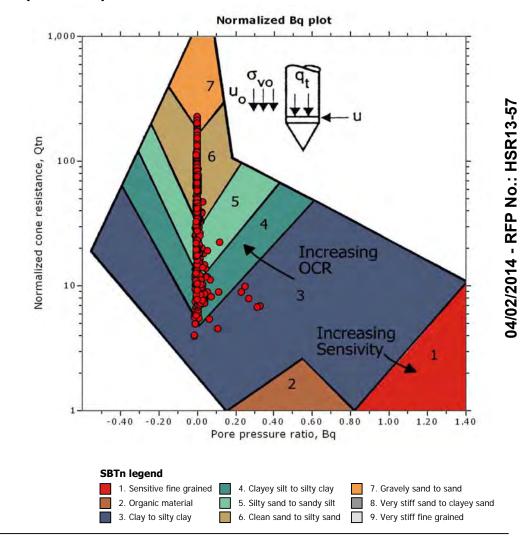




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







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**Project: California High-Speed Train** 

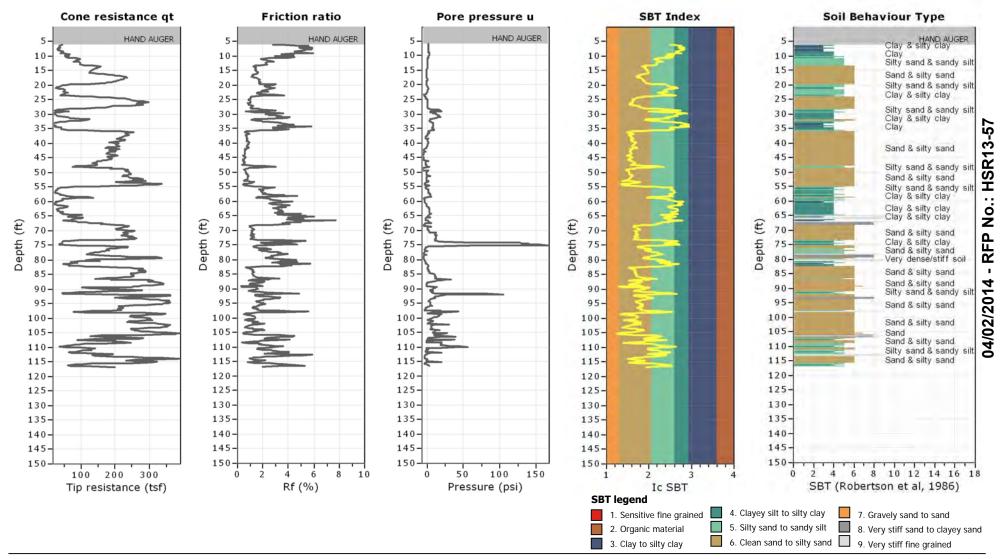
Location: Fresno-Bakersfield

CPT: S0194CPT

Total depth: 116.63 ft

Surface Elevation: 198.28 ft

Coords: X:6409444.68, Y:1898768.72





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**Project: California High-Speed Train** 

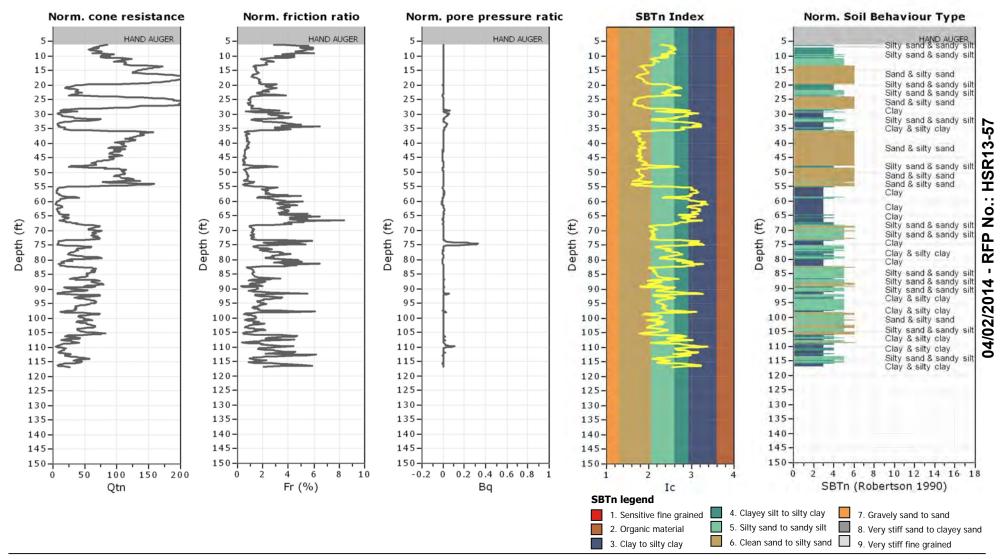
Location: Fresno-Bakersfield

CPT: S0194CPT

Total depth: 116.63 ft

Surface Elevation: 198.28 ft

Coords: X:6409444.68, Y:1898768.72



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

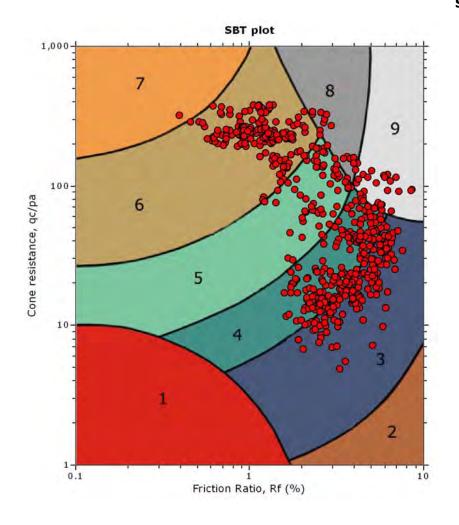
**CPT: S0195CPT** 

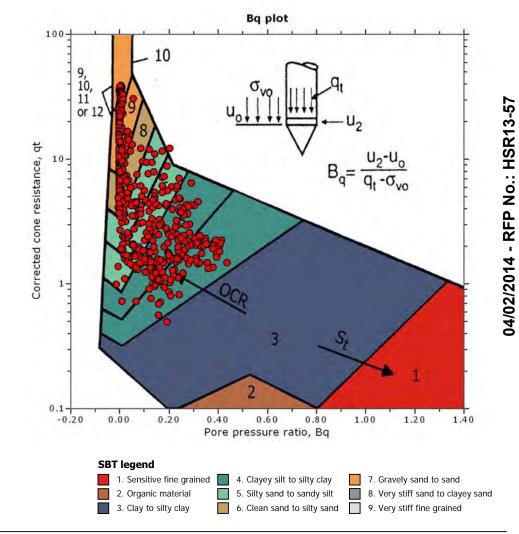
Total depth: 100.07 ft

Surface Elevation: 194.24 ft

Coords: X:6412138.46, Y:1894116.86

Cone Operator: Unknown





**Project: California High-Speed Train** 

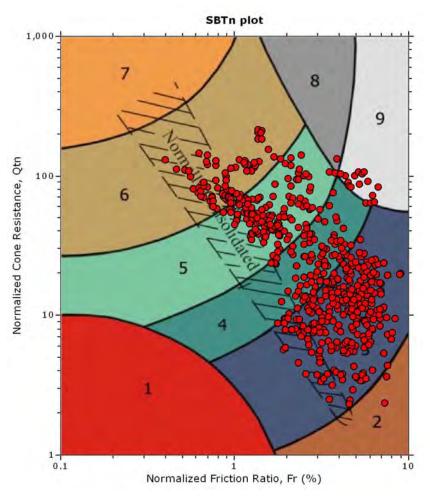
Location: Fresno-Bakersfield

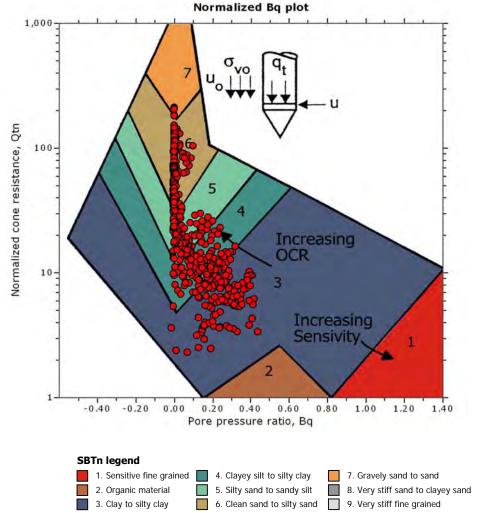
Total depth: 100.07 ft Surface Elevation: 194.24 ft

Coords: X:6412138.46, Y:1894116.86

Cone Operator: Unknown

**CPT: S0195CPT** 







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**Project: California High-Speed Train** 

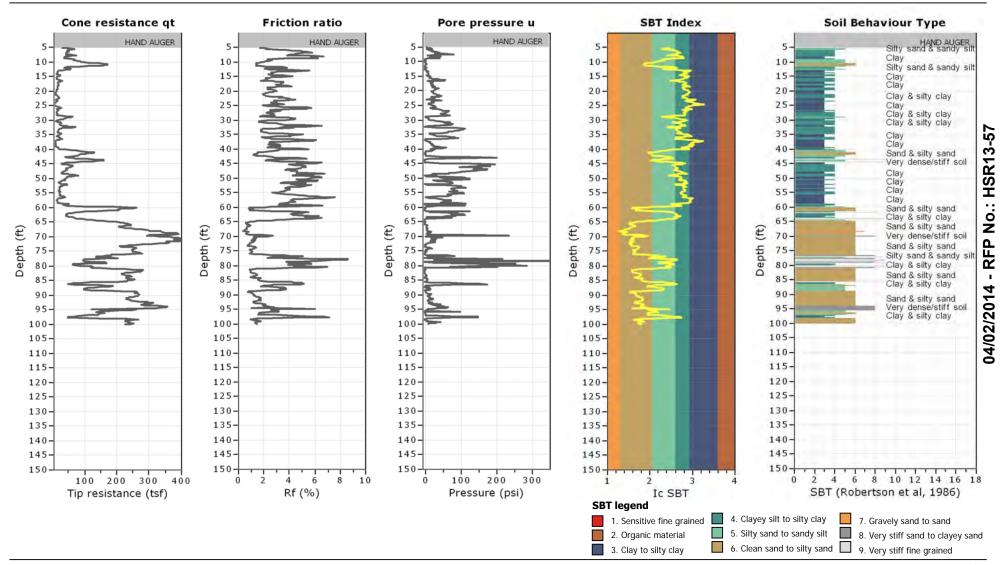
Location: Fresno-Bakersfield

CPT: S0195CPT

Total depth: 100.07 ft

Surface Elevation: 194.24 ft

Coords: X:6412138.46, Y:1894116.86





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**Project: California High-Speed Train** 

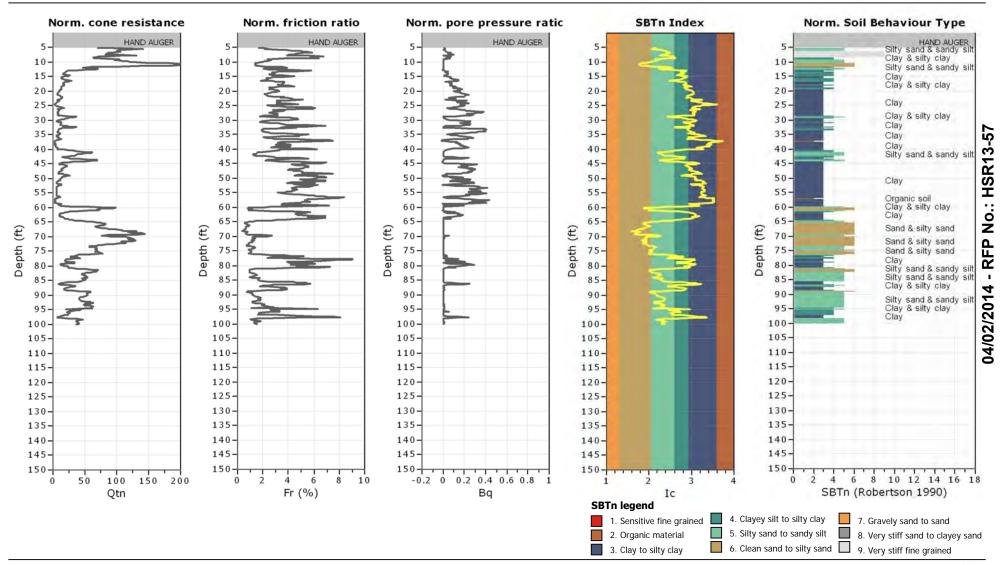
Location: Fresno-Bakersfield

**CPT: S0195CPT** 

Total depth: 100.07 ft

Surface Elevation: 194.24 ft

Coords: X:6412138.46, Y:1894116.86



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

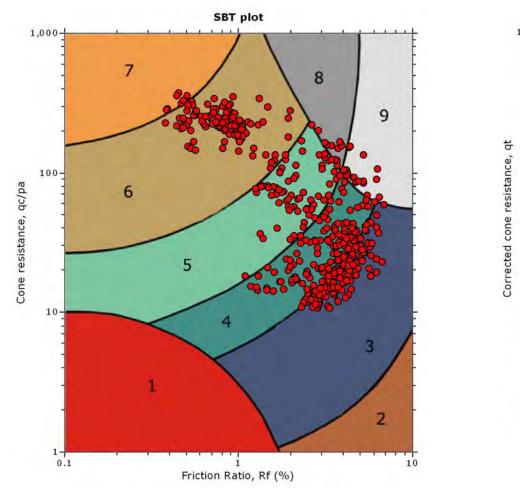
**CPT: S0198CPT** 

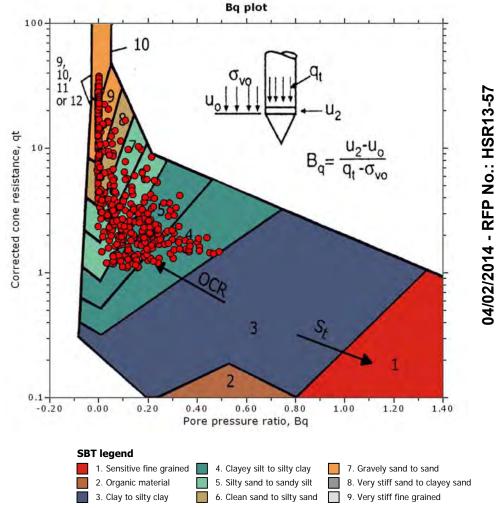
Total depth: 90.55 ft

Surface Elevation: 191.75 ft

Coords: X:6413928.20, Y:1891016.04

Cone Operator: Unknown





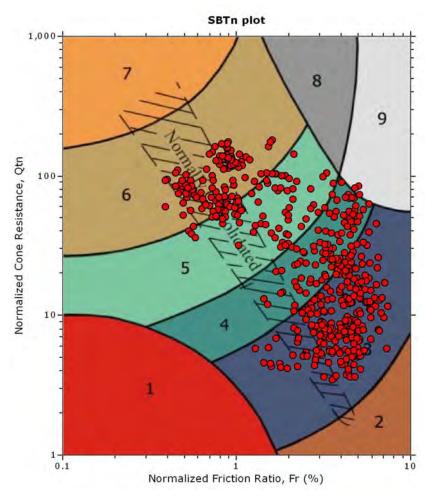


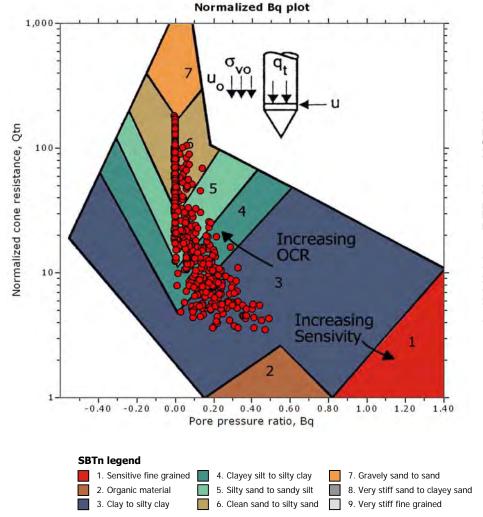
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 90.55 ft Surface Elevation: 191.75 ft Coords: X:6413928.20, Y:1891016.04

Cone Operator: Unknown







www.hsr.ca.gov

**Project: California High-Speed Train** 

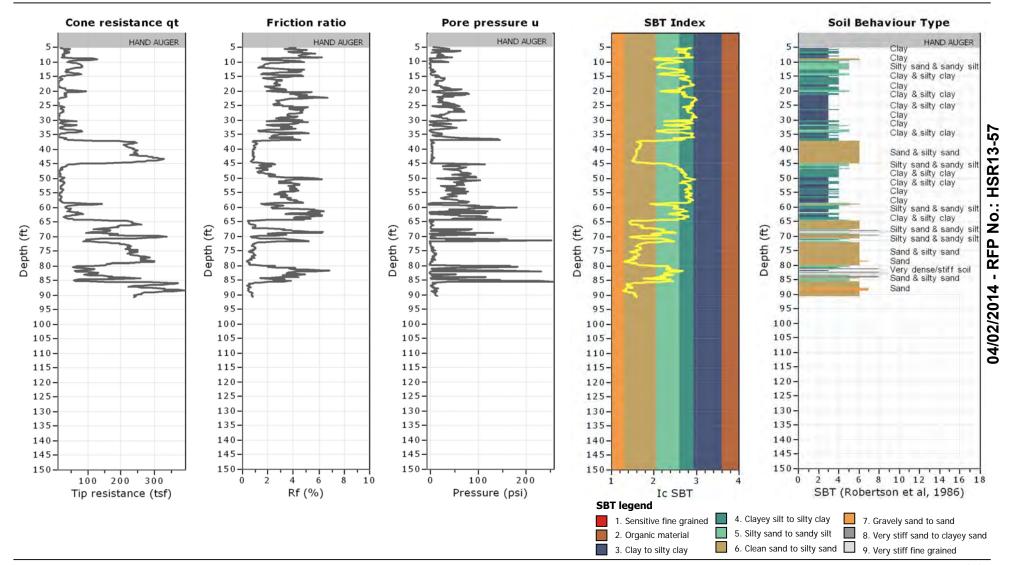
Location: Fresno-Bakersfield

CPT: S0198CPT

Total depth: 90.55 ft

Surface Elevation: 191.75 ft

Coords: X:6413928.20, Y:1891016.04





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**Project: California High-Speed Train** 

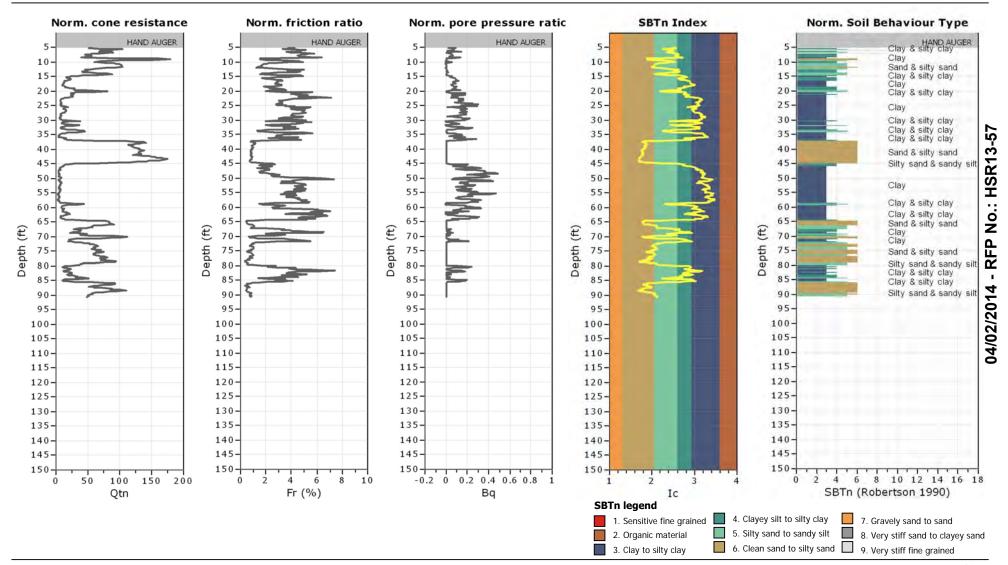
Location: Fresno-Bakersfield

CPT: S0198CPT

Total depth: 90.55 ft

Surface Elevation: 191.75 ft

Coords: X:6413928.20, Y:1891016.04



SBT plot

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Project: California High-Speed Train

Location: Fresno-Bakersfield

1,000-

100-

0.1

Cone resistance, qc/pa

rain

CPT: S0199CPT

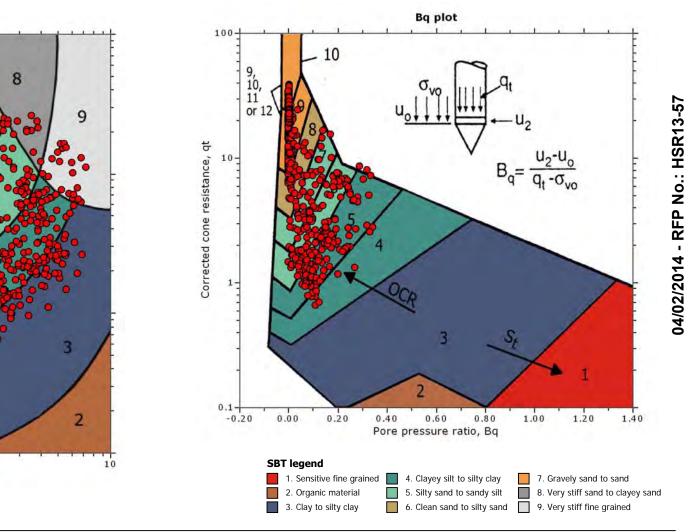
Total depth: 90.22 ft

Surface Elevation: 191.71 ft

Coords: X:6415264.45, Y:1888740.41

Cone Operator: Unknown

# SBT - Bq plots



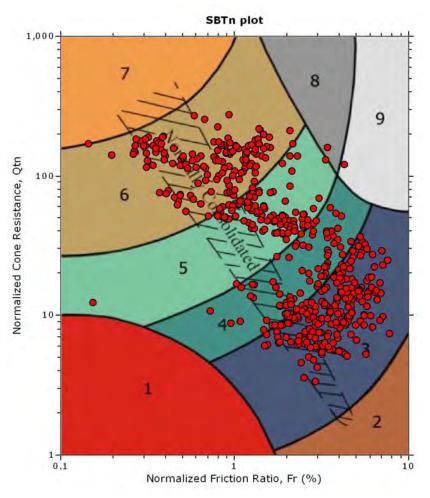
Friction Ratio, Rf (%)

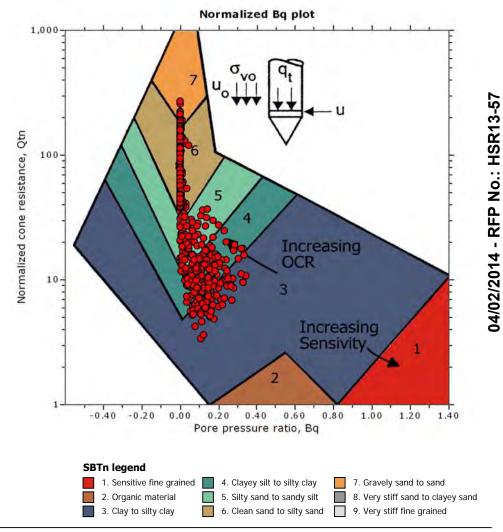
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 90.22 ft Surface Elevation: 191.71 ft Coords: X:6415264.45, Y:1888740.41

Cone Operator: Unknown







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**Project: California High-Speed Train** 

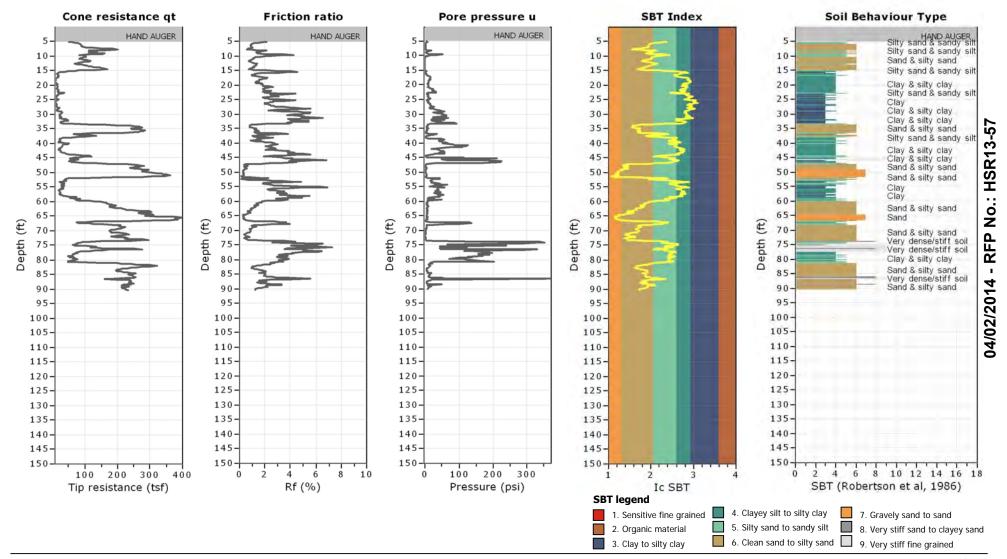
Location: Fresno-Bakersfield

CPT: S0199CPT

Total depth: 90.22 ft

Surface Elevation: 191.71 ft

Coords: X:6415264.45, Y:1888740.41





www.hsr.ca.gov

**Project: California High-Speed Train** 

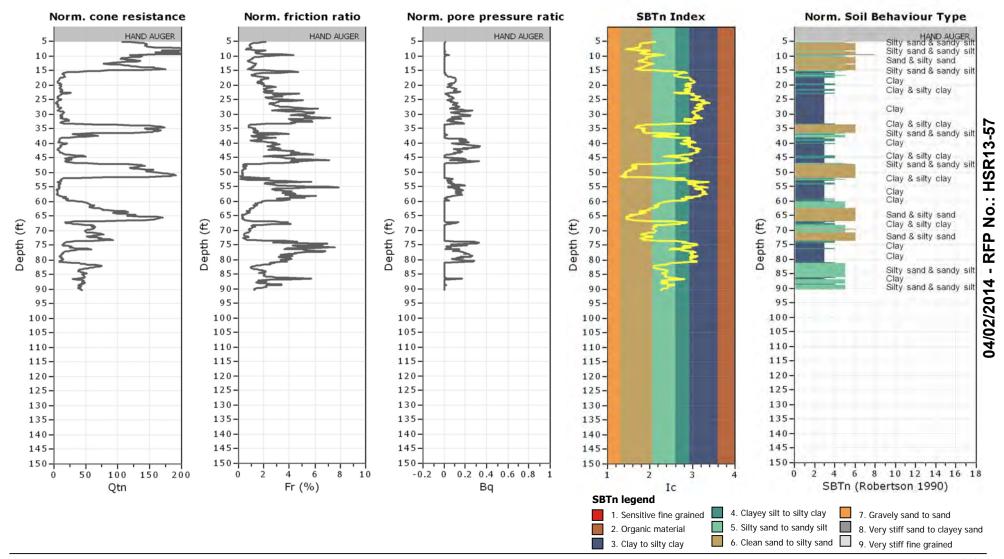
Location: Fresno-Bakersfield

CPT: S0199CPT

Total depth: 90.22 ft

Surface Elevation: 191.71 ft

Coords: X:6415264.45, Y:1888740.41



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

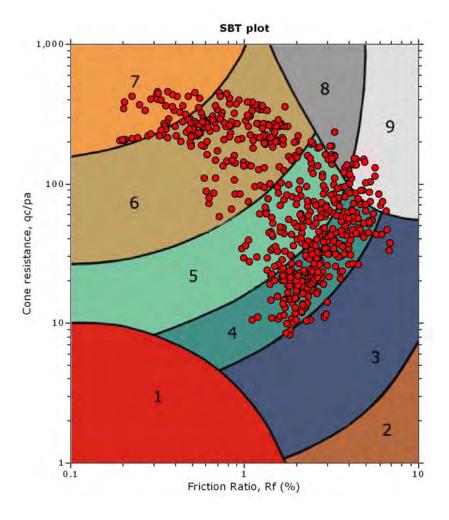
CPT: S0200CPT

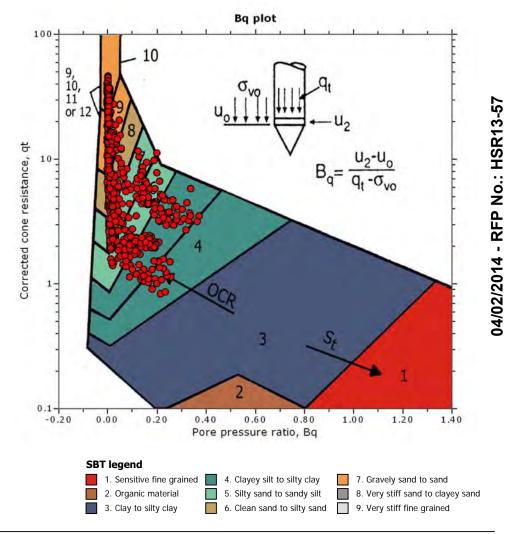
Total depth: 110.40 ft

Surface Elevation: 191.90 ft

Coords: X:6415990.94, Y:1887491.65

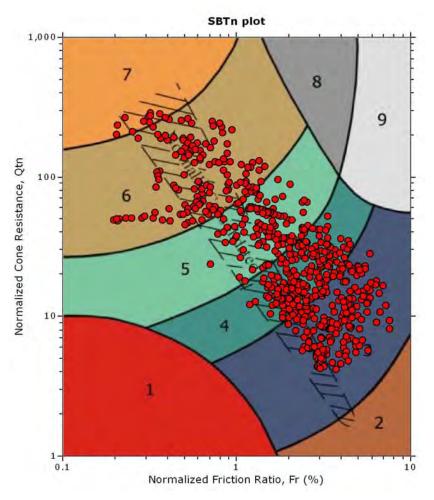
Cone Operator: Unknown

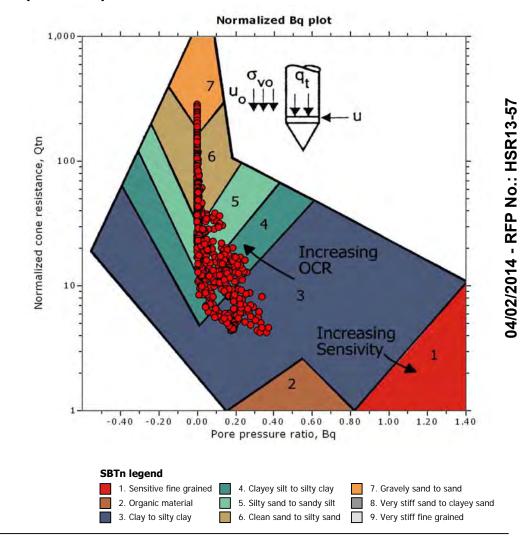




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

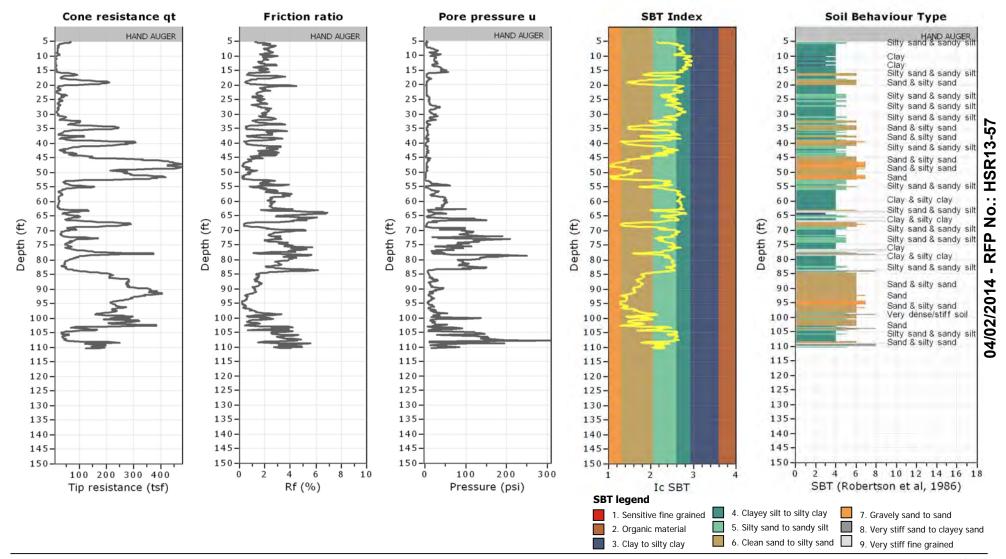
Location: Fresno-Bakersfield

CPT: S0200CPT

Total depth: 110.40 ft

Surface Elevation: 191.90 ft

Coords: X:6415990.94, Y:1887491.65





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**Project: California High-Speed Train** 

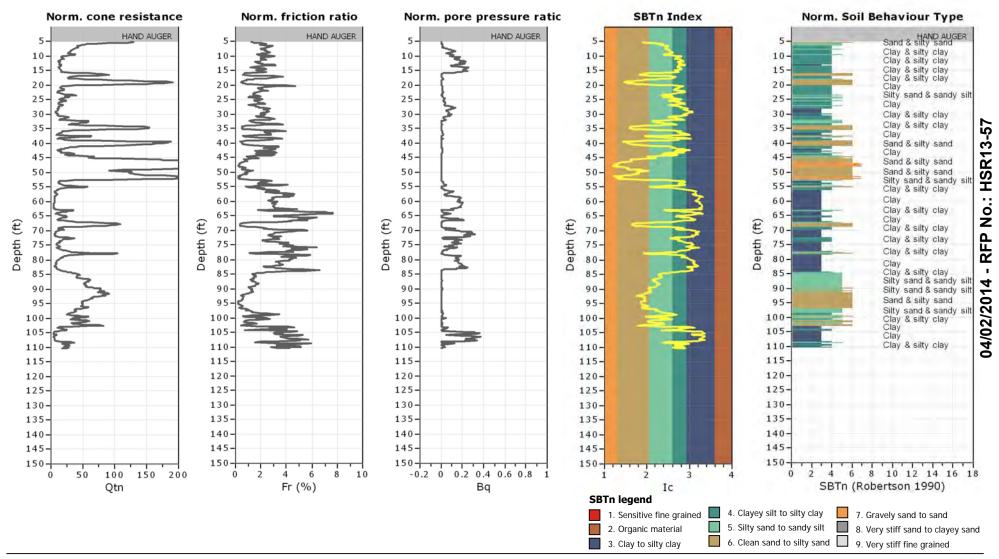
Location: Fresno-Bakersfield

CPT: S0200CPT

Total depth: 110.40 ft

Surface Elevation: 191.90 ft

Coords: X:6415990.94, Y:1887491.65



Project: California High-Speed Train

Location: Fresno-Bakersfield

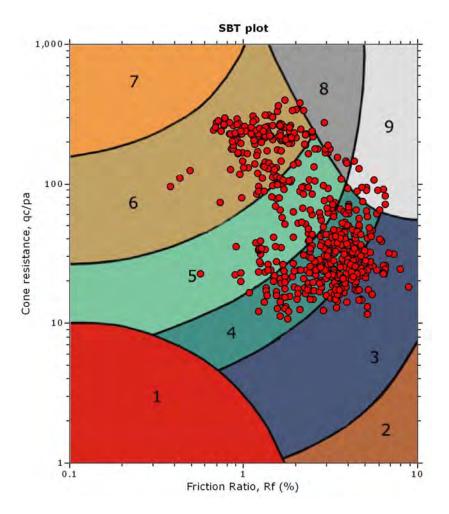
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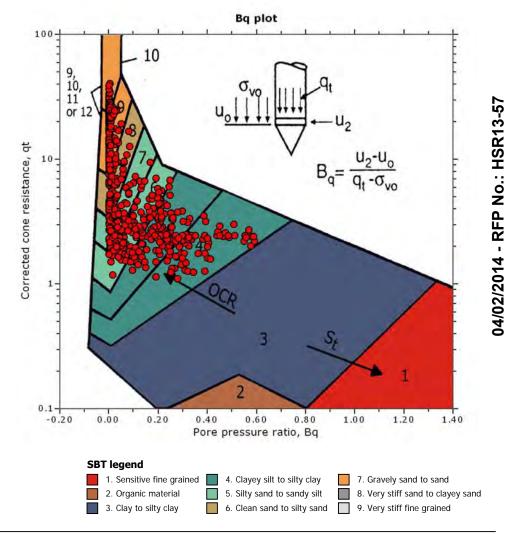
Total depth: 100.23 ft

Surface Elevation: 195.12 ft

Coords: X:6416656.29, Y:1886246.86

Cone Operator: Unknown

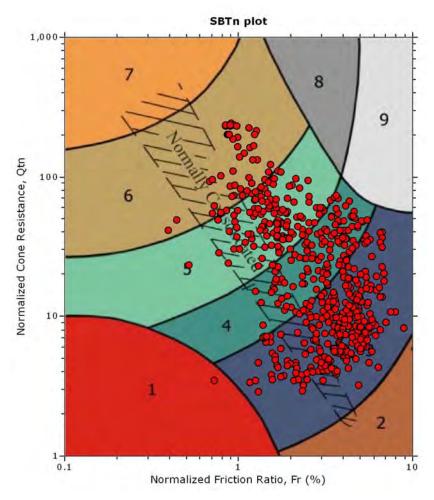


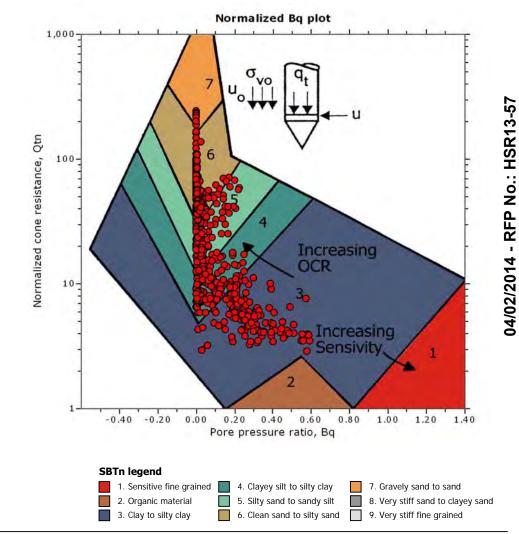




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

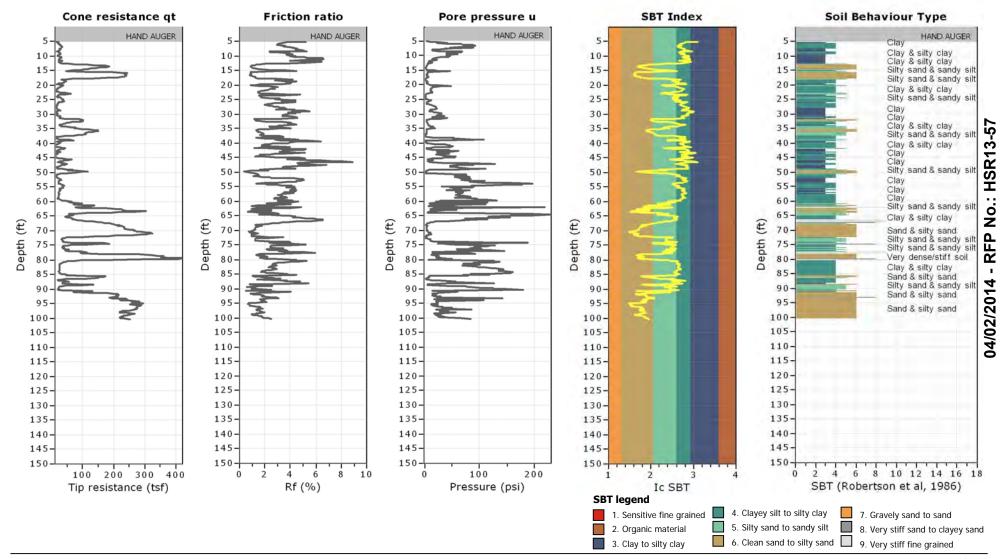
Location: Fresno-Bakersfield

CPT: S0201CPT

Total depth: 100.23 ft

Surface Elevation: 195.12 ft

Coords: X:6416656.29, Y:1886246.86





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**Project: California High-Speed Train** 

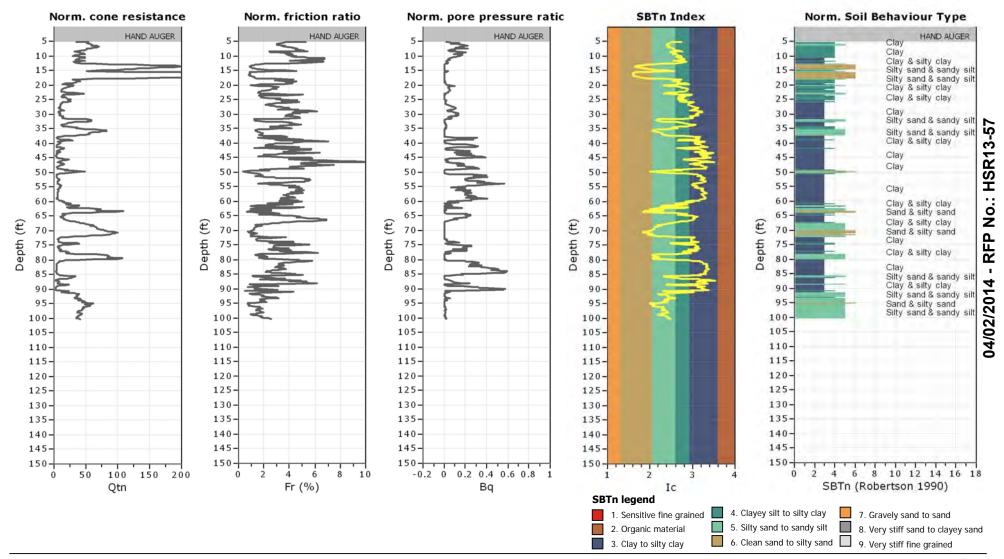
Location: Fresno-Bakersfield

CPT: S0201CPT

Total depth: 100.23 ft

Surface Elevation: 195.12 ft

Coords: X:6416656.29, Y:1886246.86



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

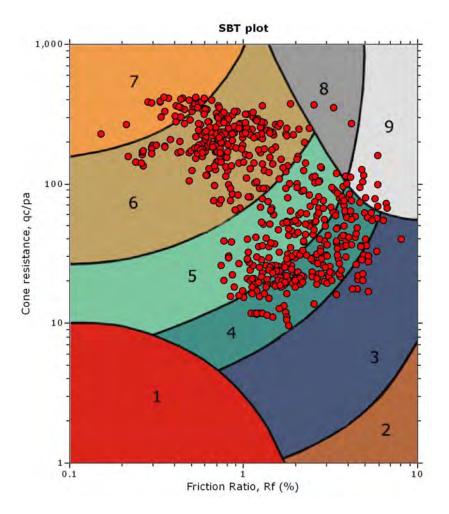
CPT: S0202CPT

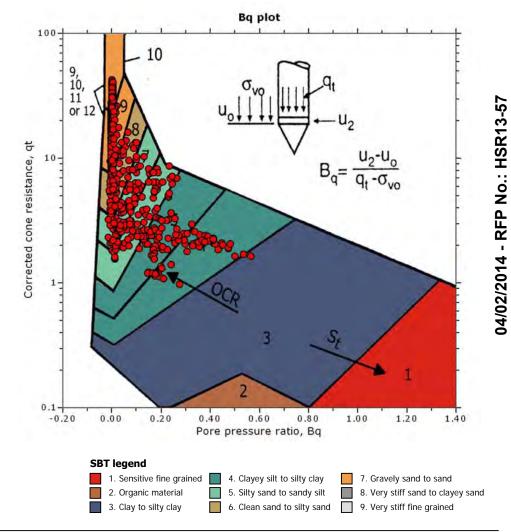
Total depth: 100.23 ft

Surface Elevation: 190.29 ft

Coords: X:6418079.71, Y:1883925.41

Cone Operator: Unknown





Total depth: 100.23 ft

Surface Elevation: 190.29 ft

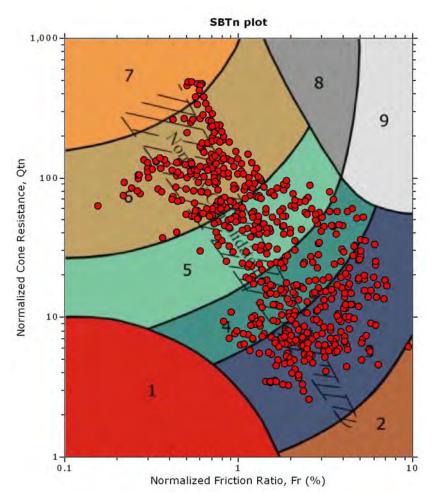
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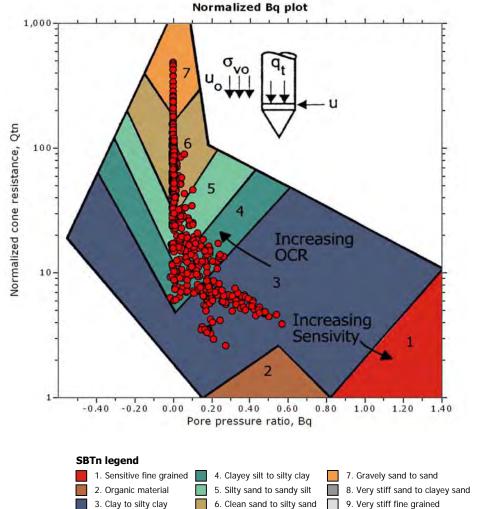
Cone Operator: Unknown

CPT: S0202CPT

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

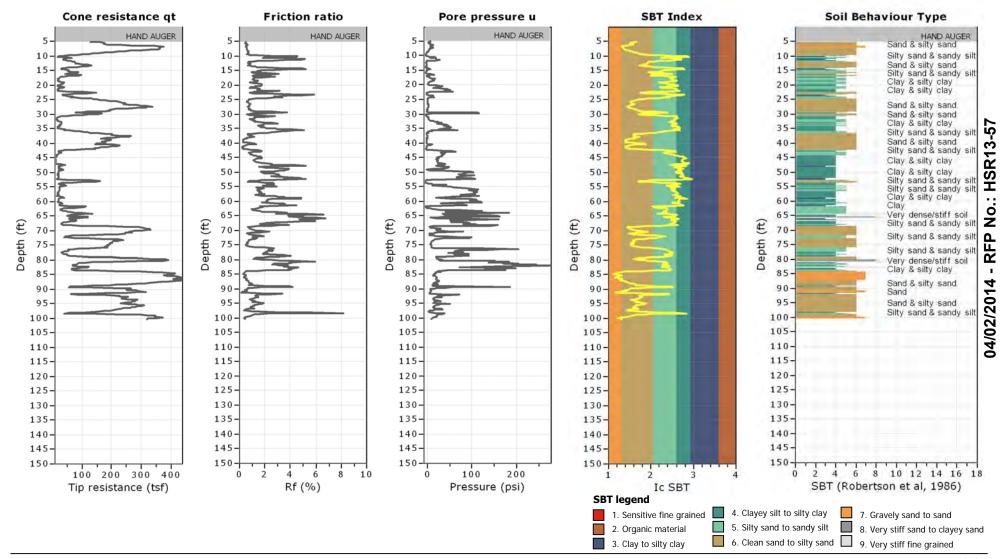
Location: Fresno-Bakersfield

CPT: S0202CPT

Total depth: 100.23 ft

Surface Elevation: 190.29 ft

Coords: X:6418079.71, Y:1883925.41





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**Project: California High-Speed Train** 

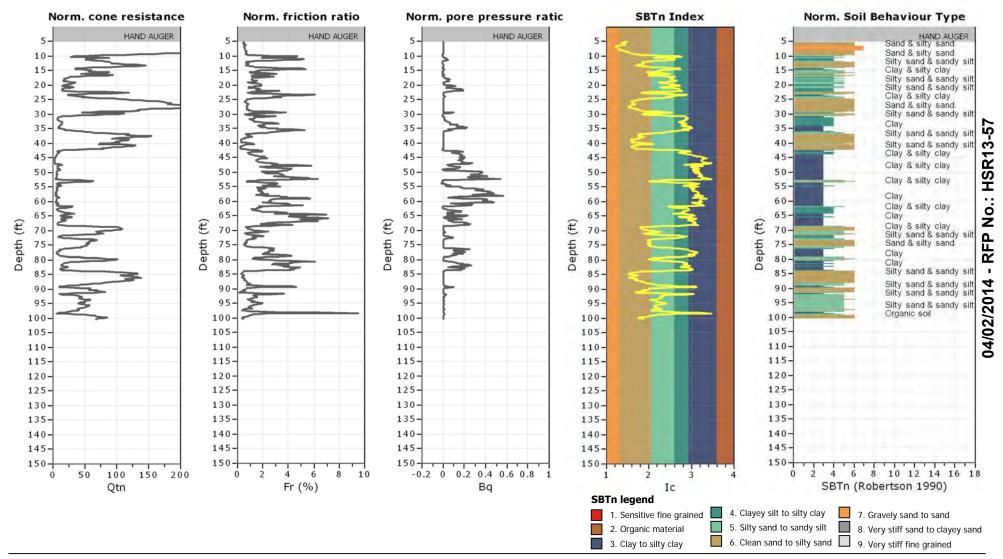
Location: Fresno-Bakersfield

CPT: S0202CPT

Total depth: 100.23 ft

Surface Elevation: 190.29 ft

Coords: X:6418079.71, Y:1883925.41



Project: California High-Speed Train

Location: Fresno-Bakersfield

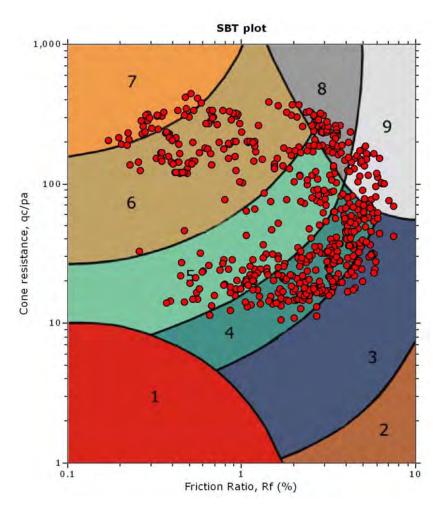
CPT: S0203CPT

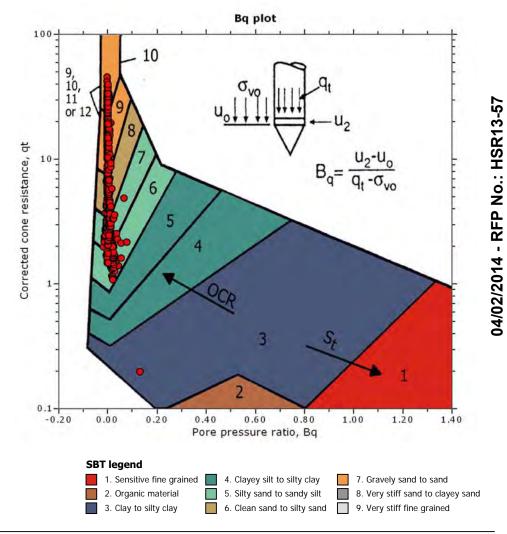
Total depth: 100.23 ft

Surface Elevation: 187.74 ft

Coords: X:6417944.46, Y:1880872.14

Cone Operator: Unknown



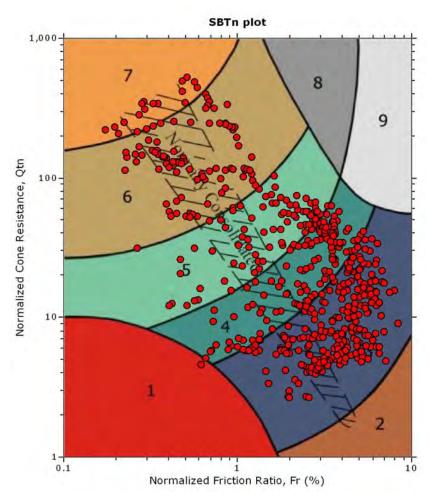


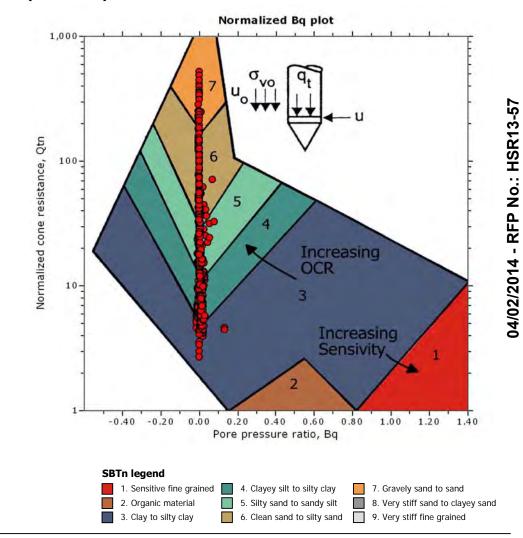
# URS HMM ARUP

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

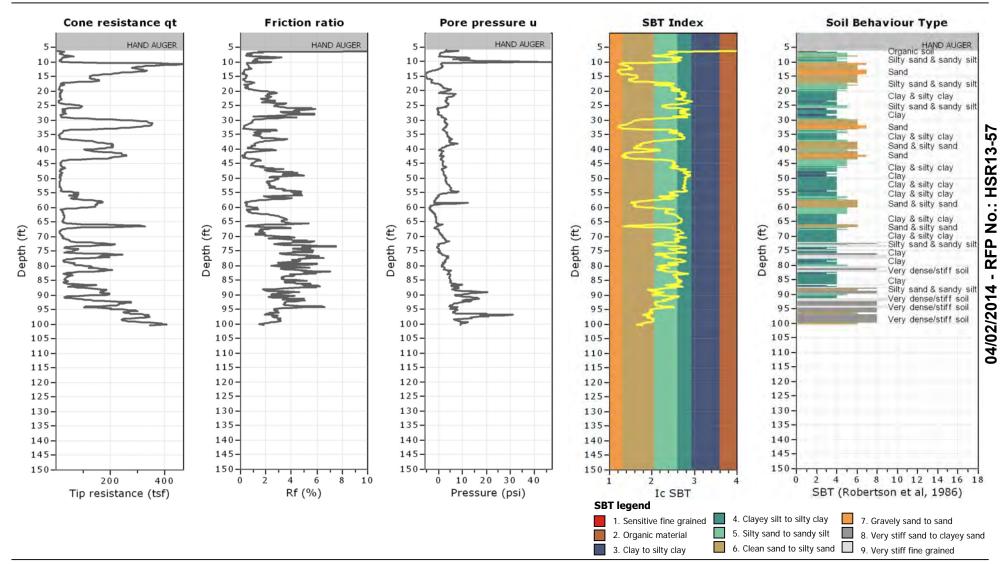
Location: Fresno-Bakersfield

CPT: S0203CPT

Total depth: 100.23 ft

Surface Elevation: 187.74 ft

Coords: X:6417944.46, Y:1880872.14





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**Project: California High-Speed Train** 

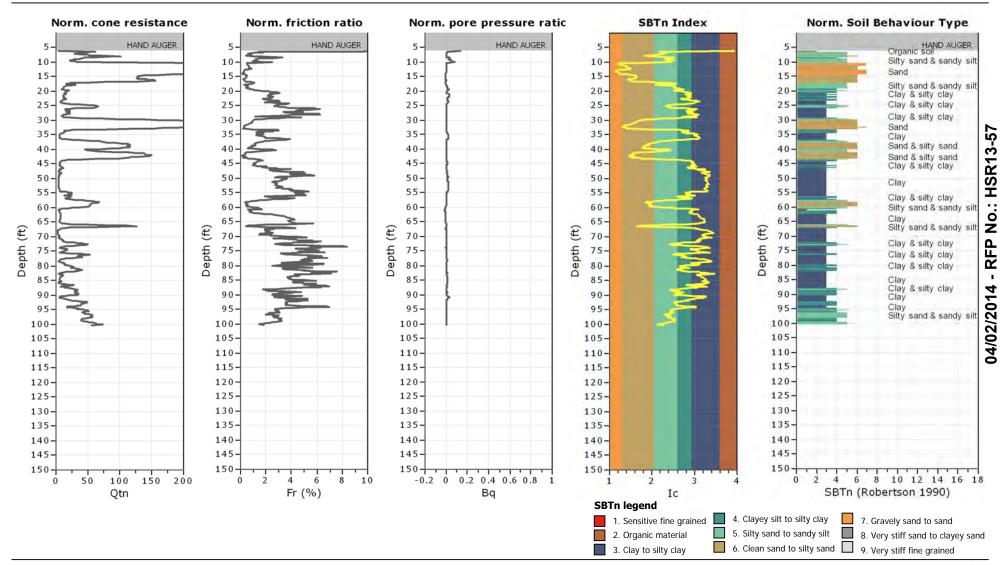
Location: Fresno-Bakersfield

CPT: S0203CPT

Total depth: 100.23 ft

Surface Elevation: 187.74 ft

Coords: X:6417944.46, Y:1880872.14



Location: Fresno-Bakersfield

Project: California High-Speed Train

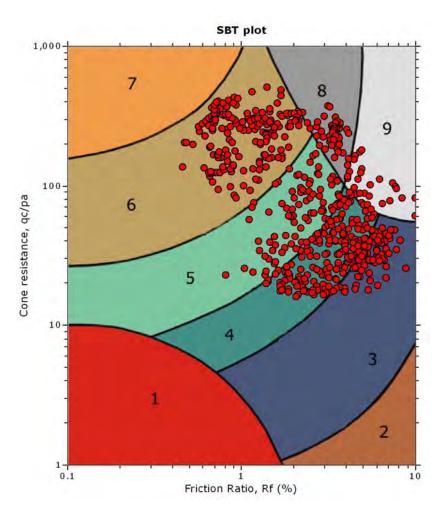
www.hsr.ca.gov

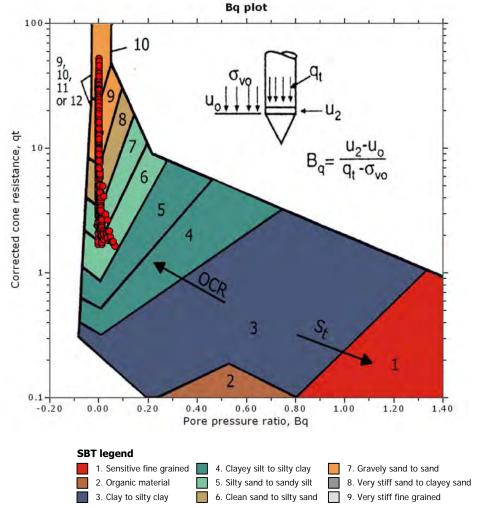
Coords: X:6420420.17, Y:1880830.60

Cone Operator: Unknown

Surface Elevation: 189.34 ft

CPT: S0204CPT Total depth: 102.69 ft





CPT: S0204CPT

Total depth: 102.69 ft Surface Elevation: 189.34 ft

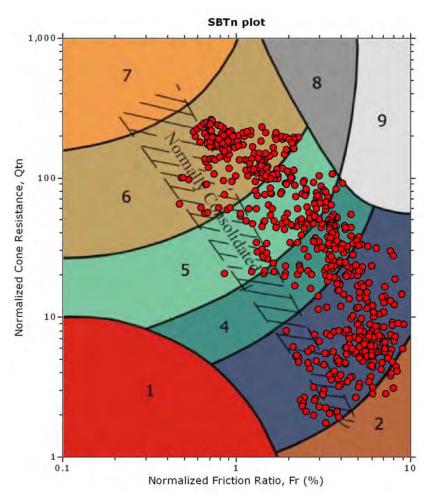
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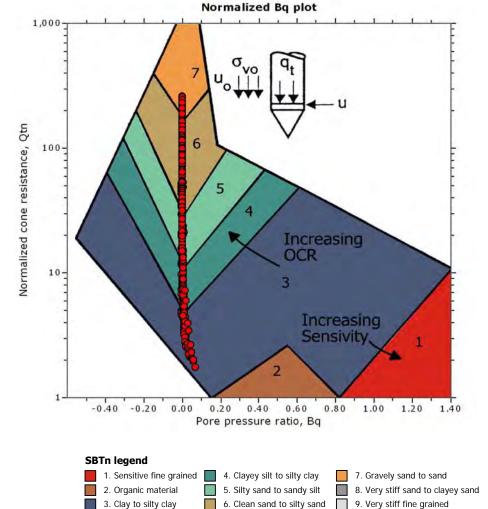
Cone Operator: Unknown

**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

URS HMM ARUP







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**Project: California High-Speed Train** 

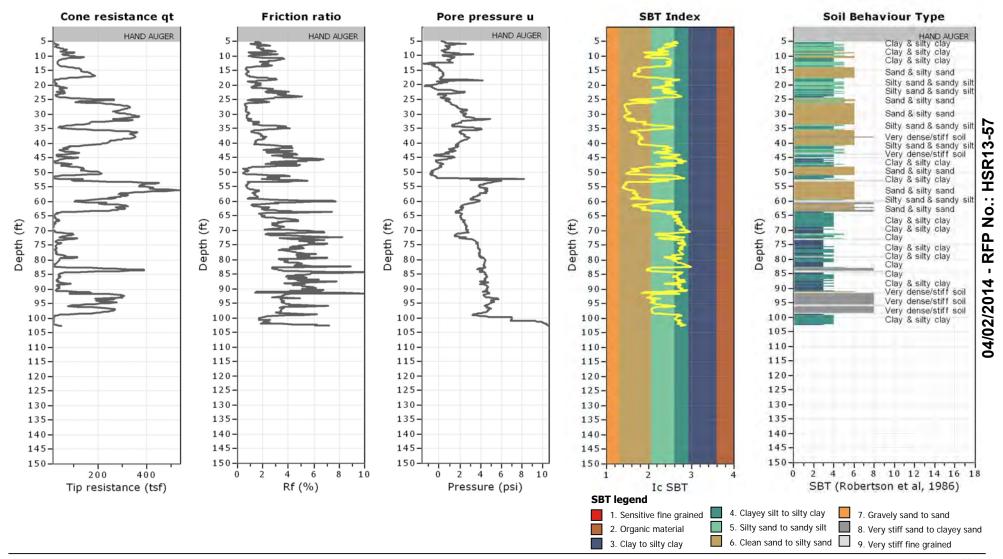
Location: Fresno-Bakersfield

CPT: S0204CPT

Total depth: 102.69 ft

Surface Elevation: 189.34 ft

Coords: X:6420420.17, Y:1880830.60





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Project: California High-Speed Train

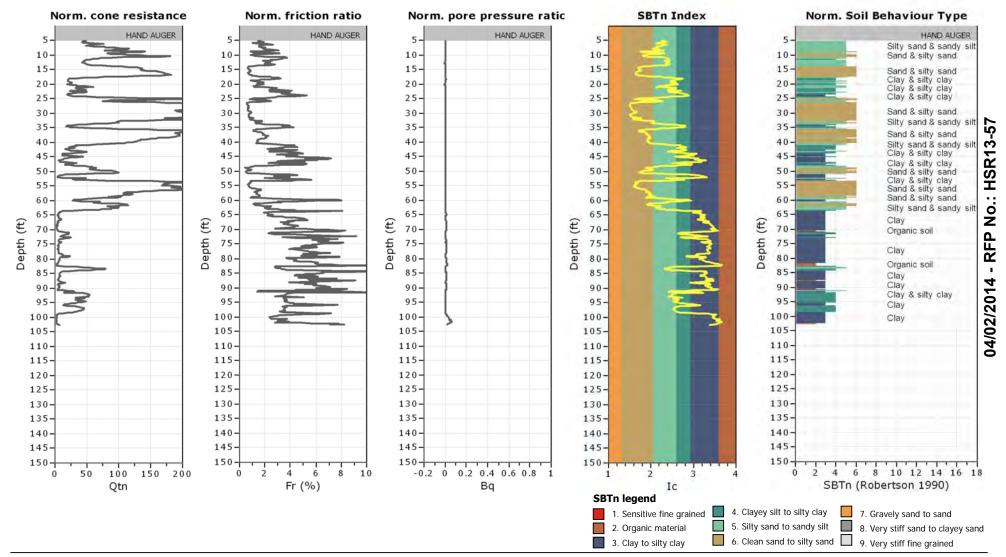
Location: Fresno-Bakersfield

CPT: S0204CPT

Total depth: 102.69 ft

Surface Elevation: 189.34 ft

Coords: X:6420420.17, Y:1880830.60



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

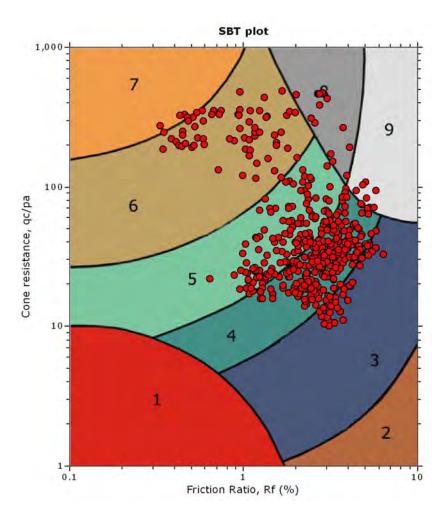
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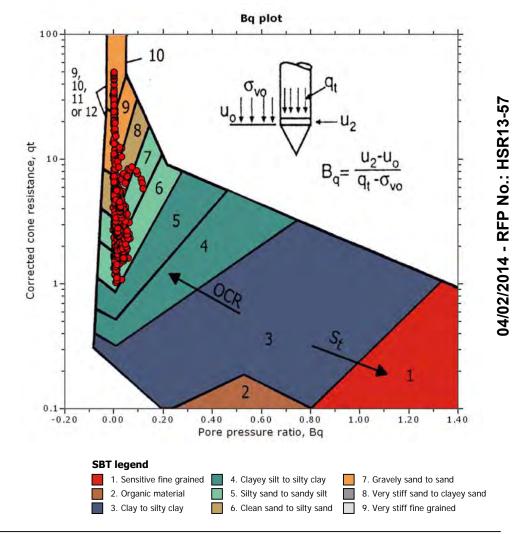
Total depth: 85.14 ft

Surface Elevation: 186.18 ft

Coords: X:6422594.08, Y:1876248.96

Cone Operator: Unknown



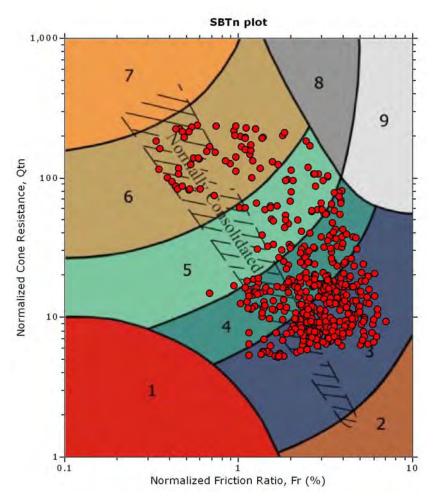


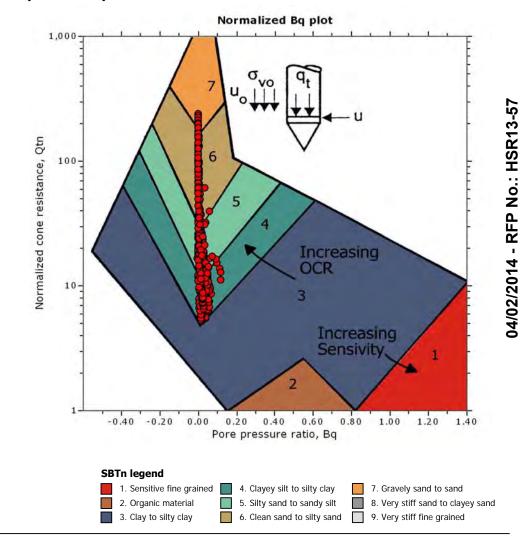
Surface Elevation: 186.18 ft

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

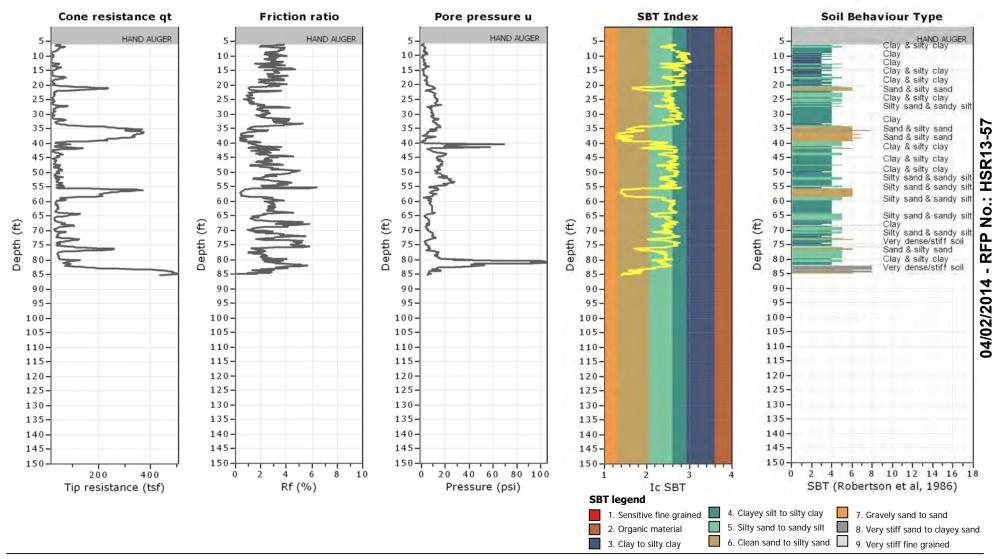
Location: Fresno-Bakersfield

CPT: S0206CPT

Total depth: 85.14 ft

Surface Elevation: 186.18 ft

Coords: X:6422594.08, Y:1876248.96





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**Project: California High-Speed Train** 

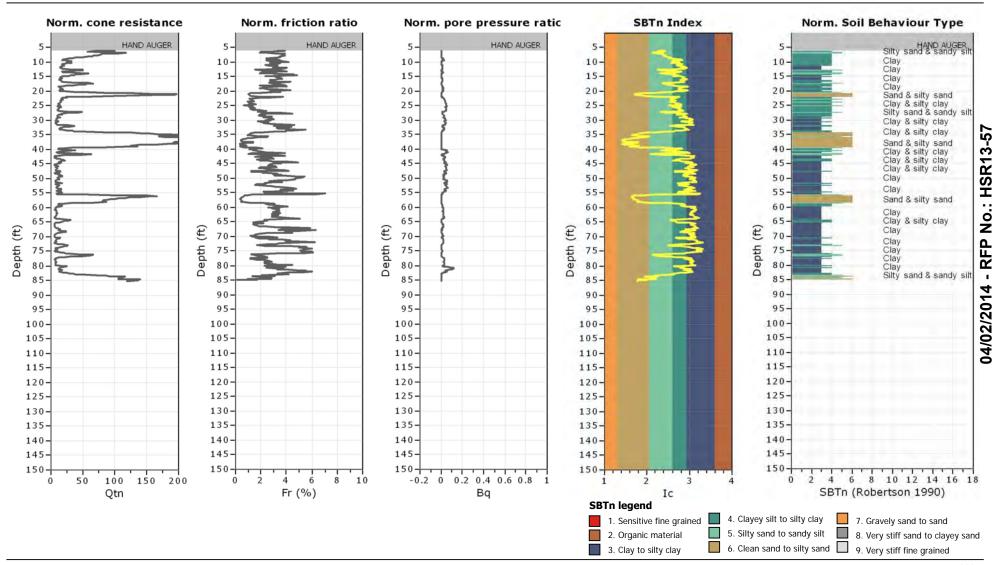
Location: Fresno-Bakersfield

CPT: S0206CPT

Total depth: 85.14 ft

Surface Elevation: 186.18 ft

Coords: X:6422594.08, Y:1876248.96



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

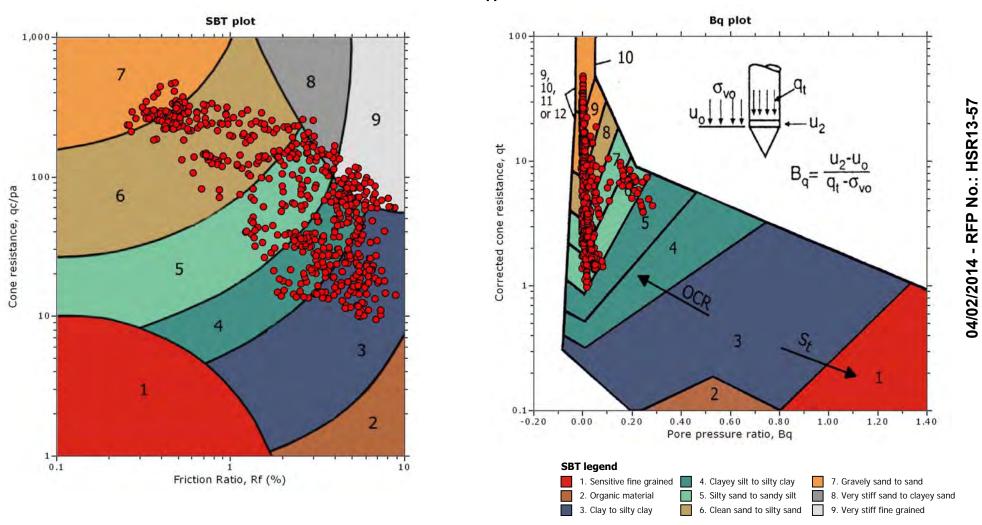
CPT: S0208CPT

Total depth: 103.18 ft

Surface Elevation: 189.27 ft

Coords: X:6425250.59, Y:1871625.85

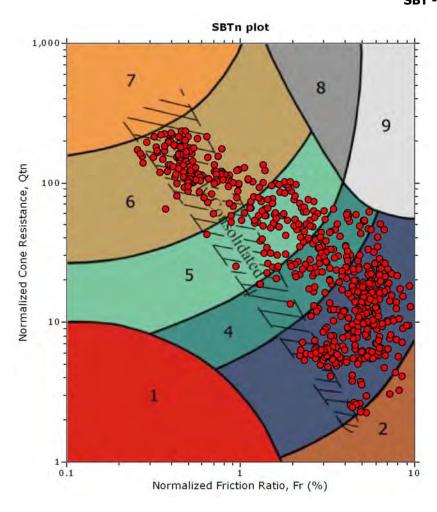
Cone Operator: Unknown

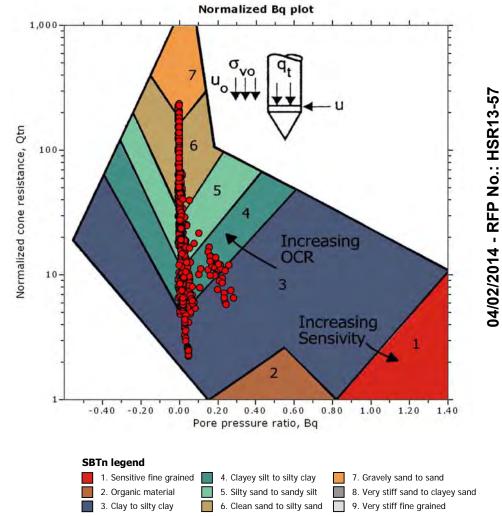




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







www.hsr.ca.gov

**Project: California High-Speed Train** 

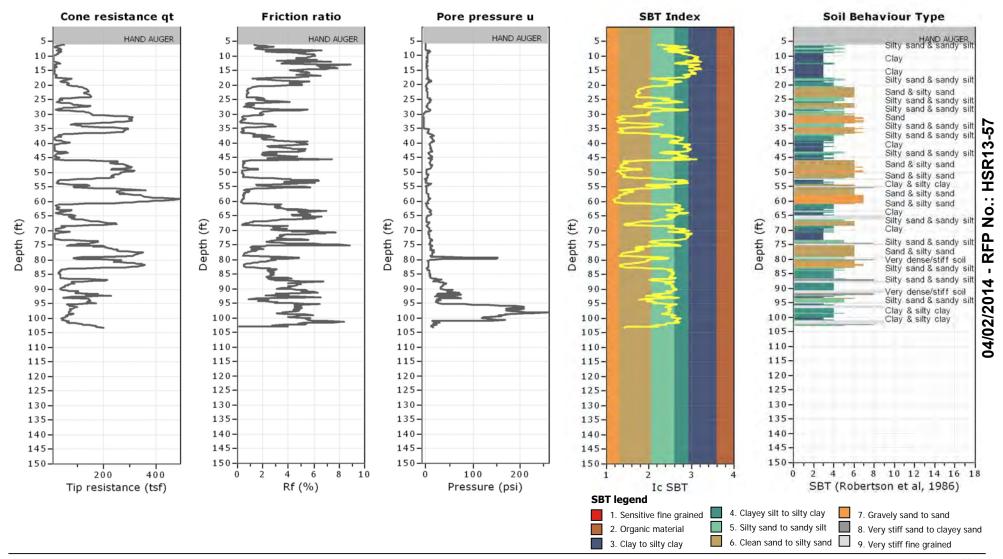
Location: Fresno-Bakersfield

CPT: S0208CPT

Total depth: 103.18 ft

Surface Elevation: 189.27 ft

Coords: X:6425250.59, Y:1871625.85





www.hsr.ca.gov

**Project: California High-Speed Train** 

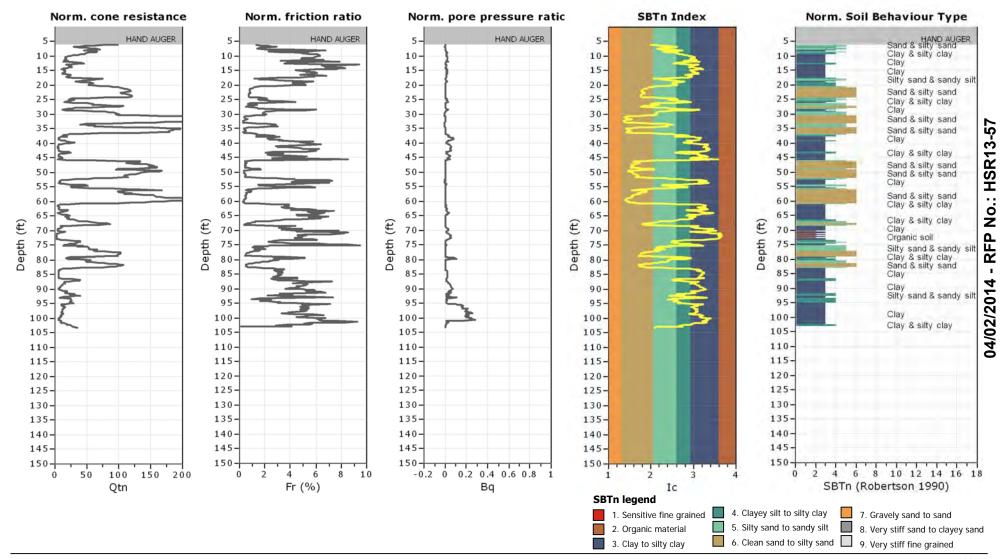
Location: Fresno-Bakersfield

CPT: S0208CPT

Total depth: 103.18 ft

Surface Elevation: 189.27 ft

Coords: X:6425250.59, Y:1871625.85



**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

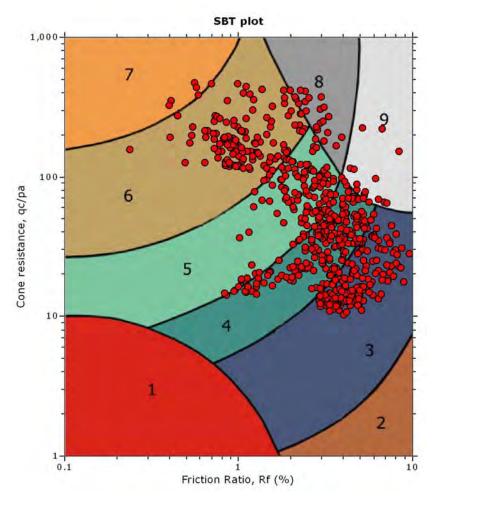
CPT: S0210CPT

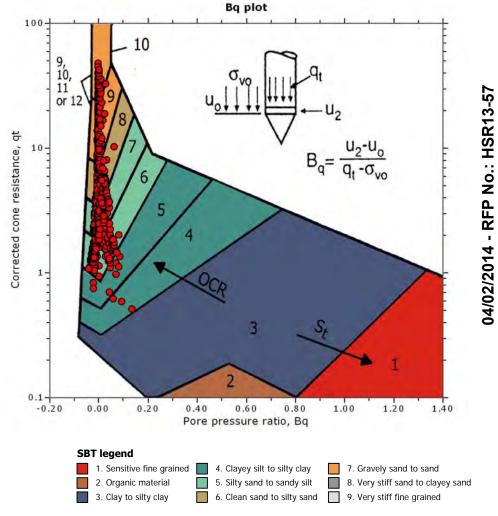
Total depth: 112.70 ft

Surface Elevation: 194.68 ft

Coords: X:6427598.20, Y:1867721.24

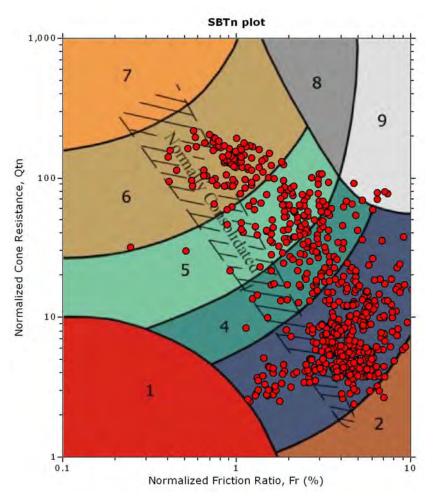
Cone Operator: Unknown

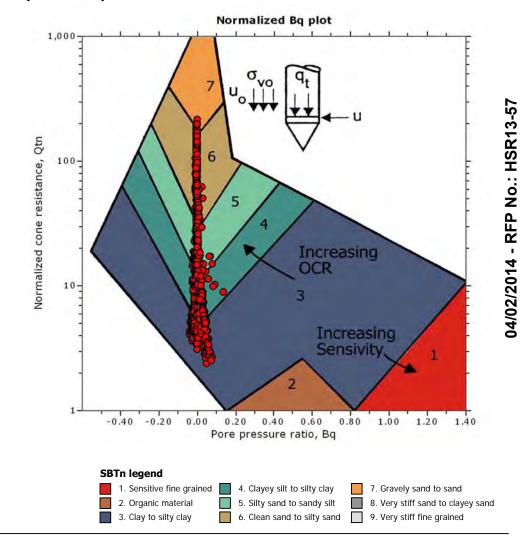




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







www.hsr.ca.gov

**Project: California High-Speed Train** 

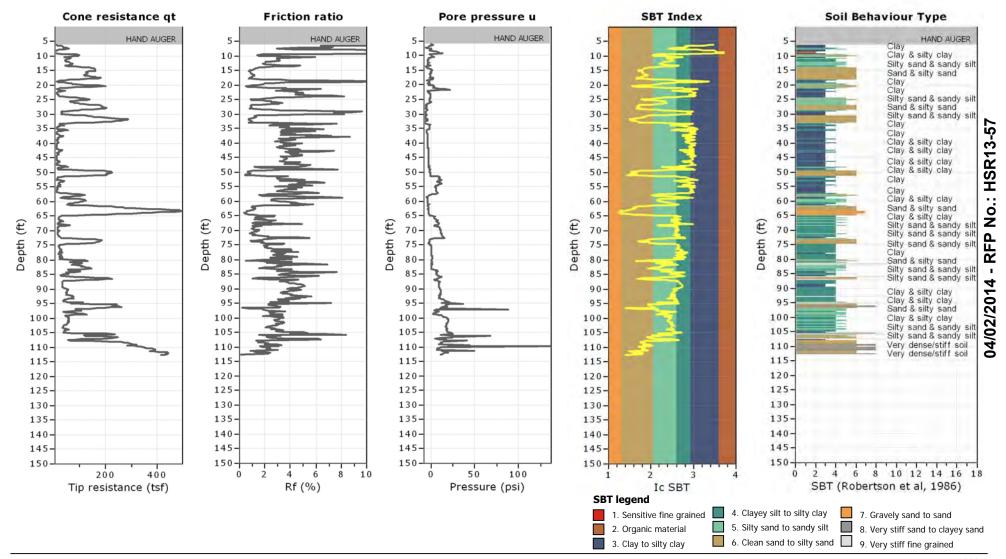
Location: Fresno-Bakersfield

CPT: S0210CPT

Total depth: 112.70 ft

Surface Elevation: 194.68 ft

Coords: X:6427598.20, Y:1867721.24





www.hsr.ca.gov

**Project: California High-Speed Train** 

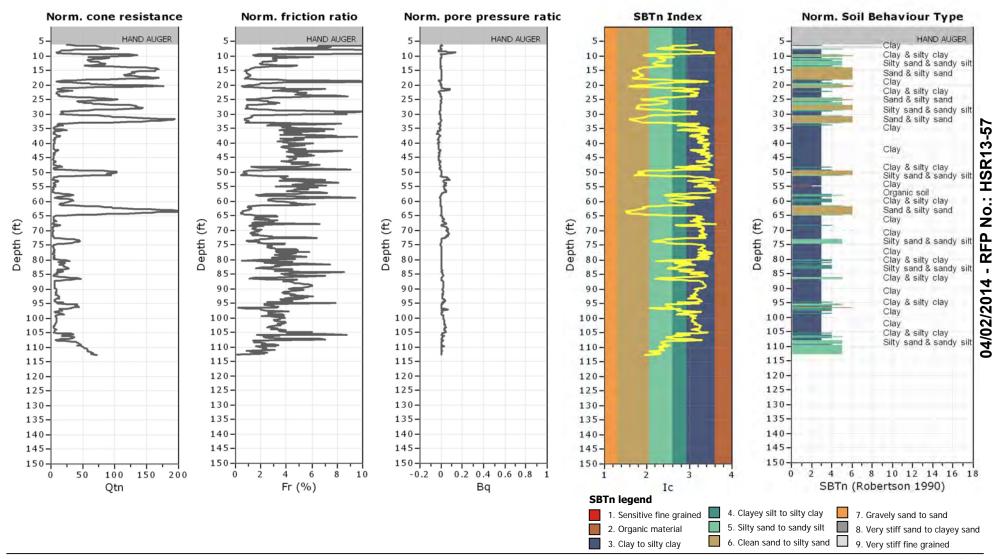
Location: Fresno-Bakersfield

CPT: S0210CPT

Total depth: 112.70 ft

Surface Elevation: 194.68 ft

Coords: X:6427598.20, Y:1867721.24



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0211CPT

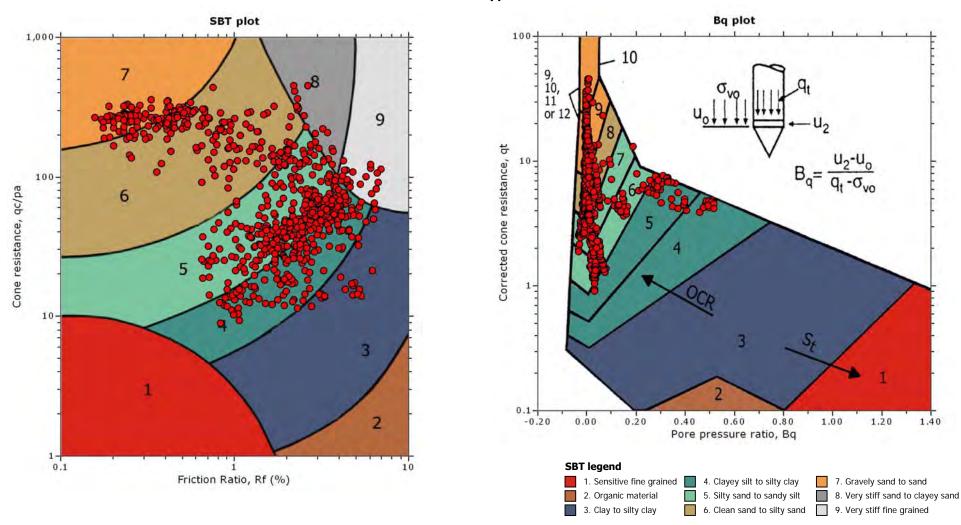
Total depth: 123.52 ft

Surface Elevation: 194.44 ft

Coords: X:6429137.53, Y:1865107.12

Cone Operator: Unknown

# SBT - Bq plots

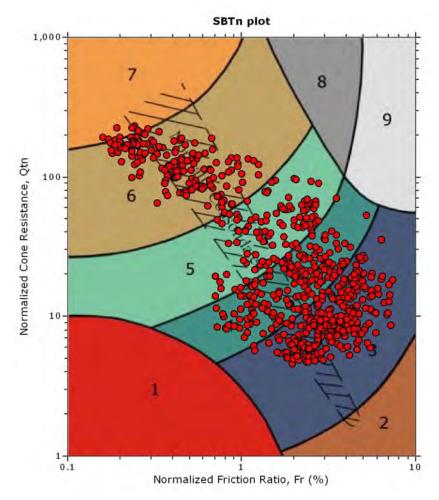


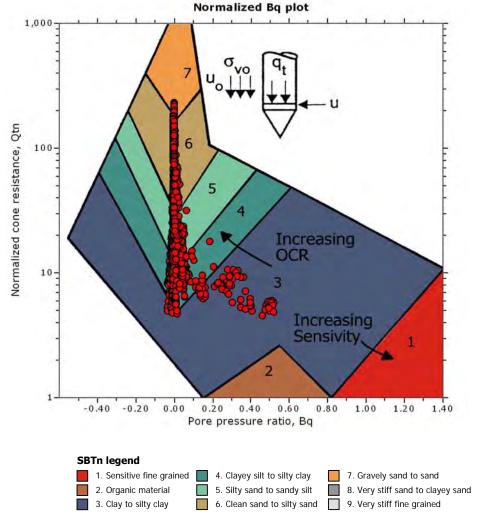
04/02/2014 - RFP No.: HSR13-57



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

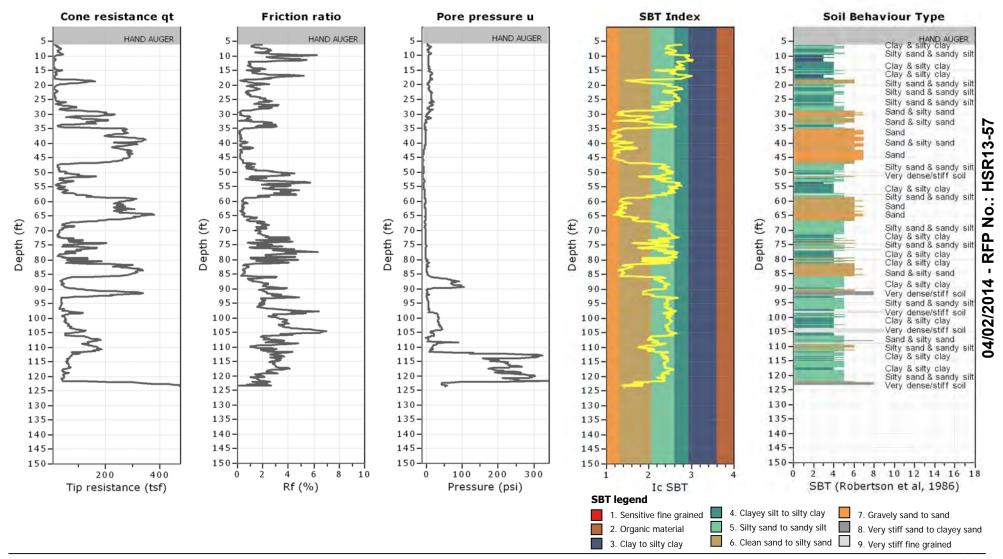
Location: Fresno-Bakersfield

CPT: S0211CPT

Total depth: 123.52 ft

Surface Elevation: 194.44 ft

Coords: X:6429137.53, Y:1865107.12





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**Project: California High-Speed Train** 

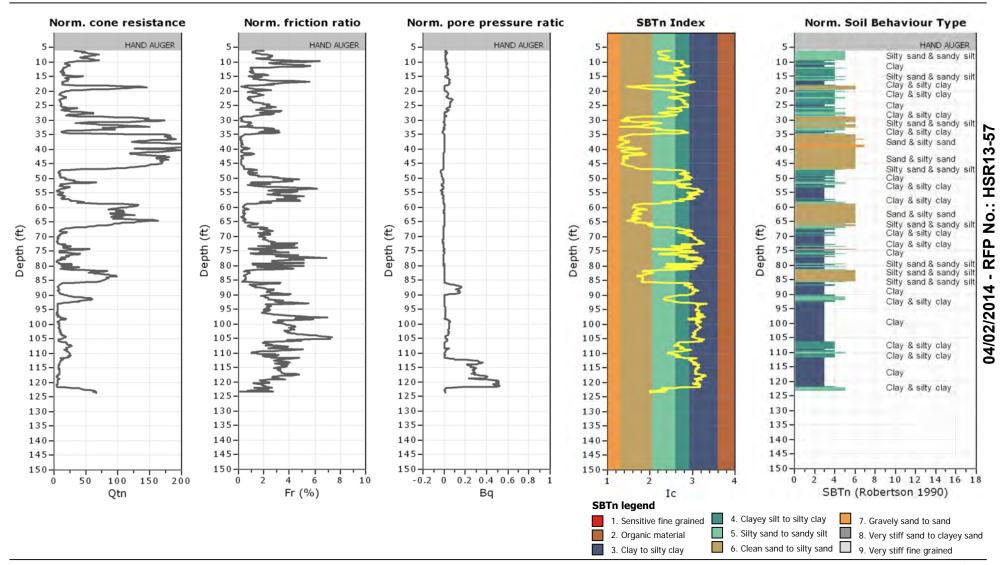
Location: Fresno-Bakersfield

CPT: S0211CPT

Total depth: 123.52 ft

Surface Elevation: 194.44 ft

Coords: X:6429137.53, Y:1865107.12



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

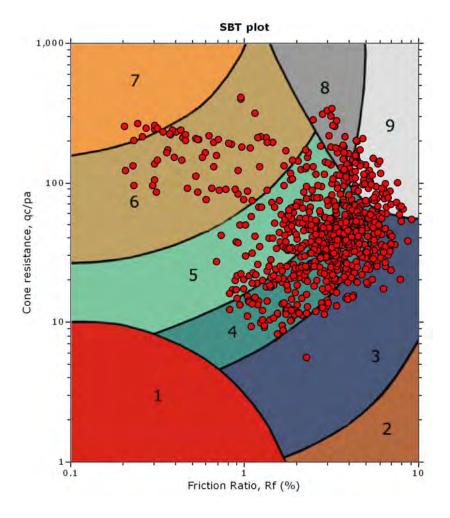
CPT: S0212CPT

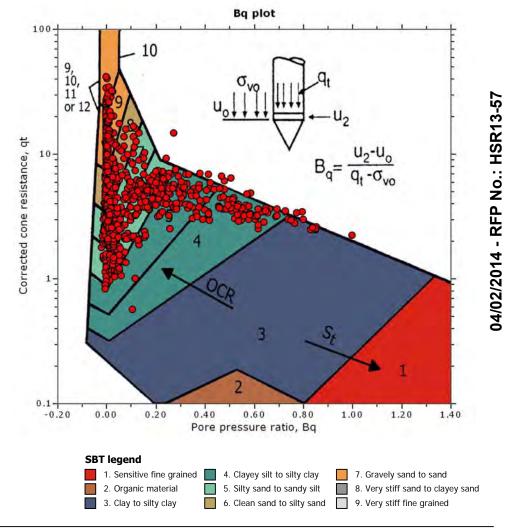
Total depth: 144.52 ft

Surface Elevation: 192.16 ft

Coords: X:6427961.50, Y:1864918.23

Cone Operator: Unknown





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

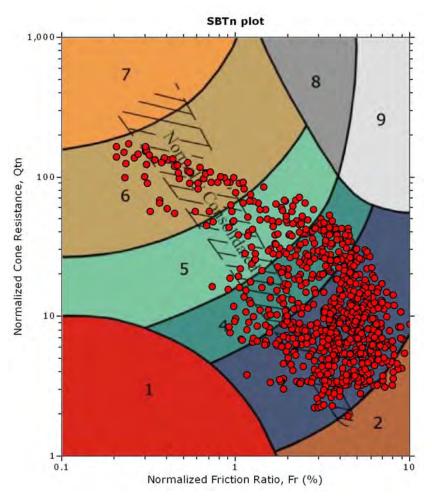
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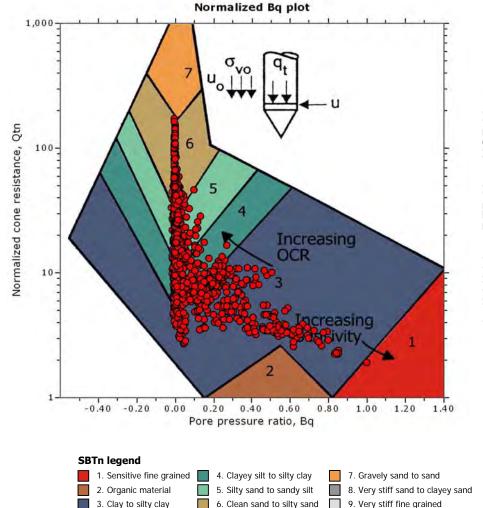
Total depth: 144.52 ft

Surface Elevation: 192.16 ft

Coords: X:6427961.50, Y:1864918.23

Cone Operator: Unknown







**Project: California High-Speed Train** 

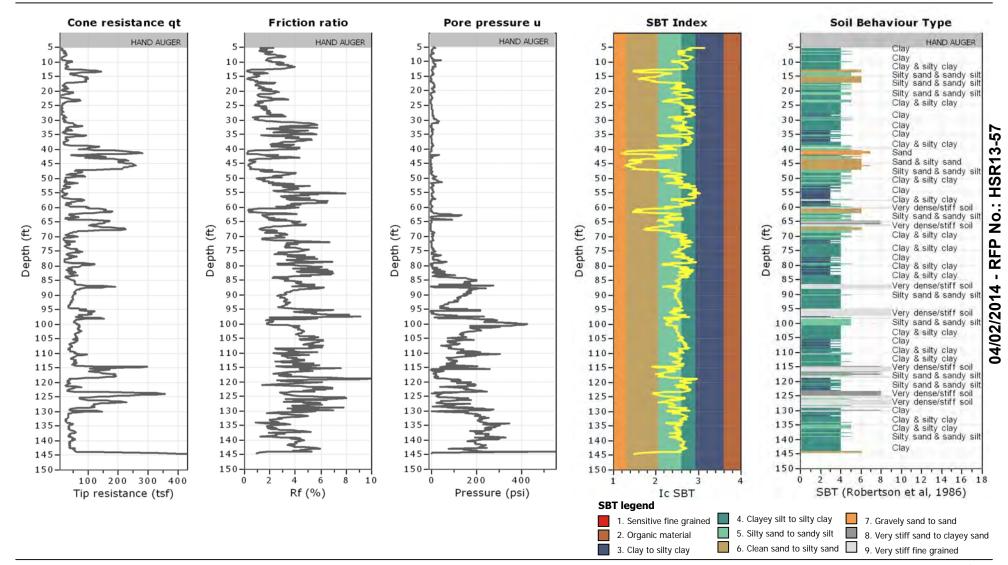
Location: Fresno-Bakersfield

CPT: S0212CPT

Total depth: 144.52 ft

Surface Elevation: 192.16 ft

Coords: X:6427961.50, Y:1864918.23





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**Project: California High-Speed Train** 

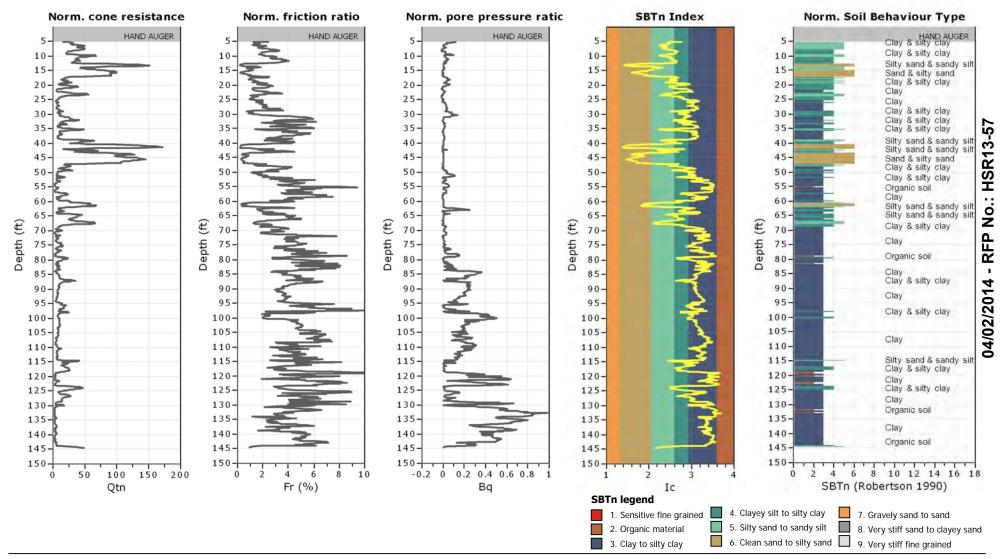
Location: Fresno-Bakersfield

CPT: S0212CPT

Total depth: 144.52 ft

Surface Elevation: 192.16 ft

Coords: X:6427961.50, Y:1864918.23



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

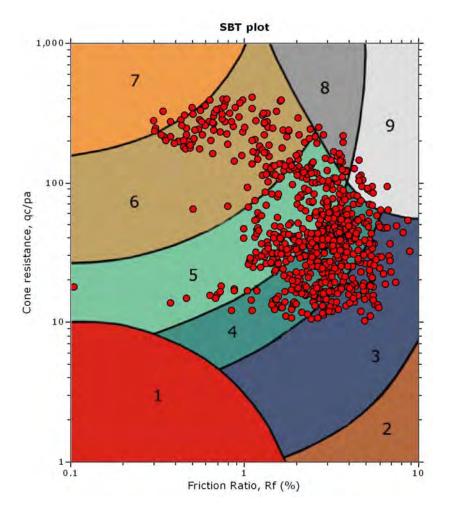
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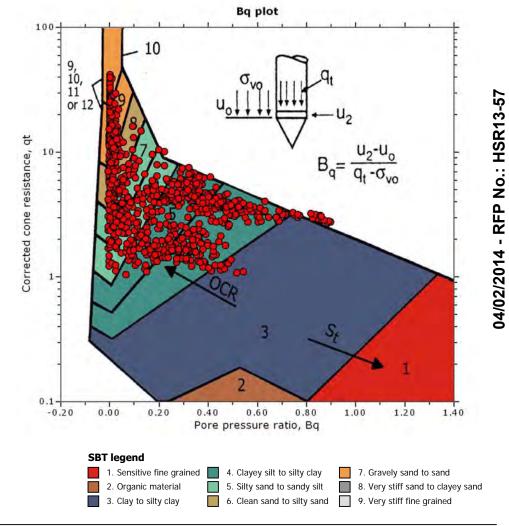
Total depth: 143.37 ft

Surface Elevation: 194.03 ft

Coords: X:6431891.18, Y:1860287.60

Cone Operator: Unknown



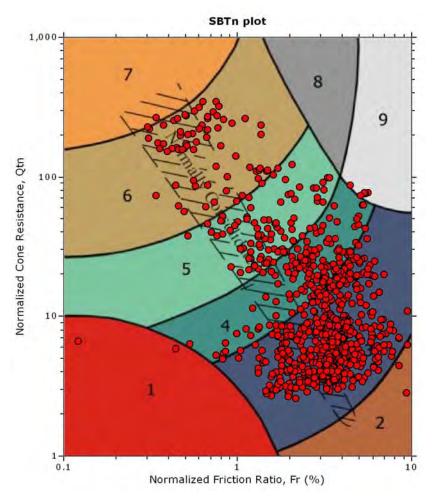


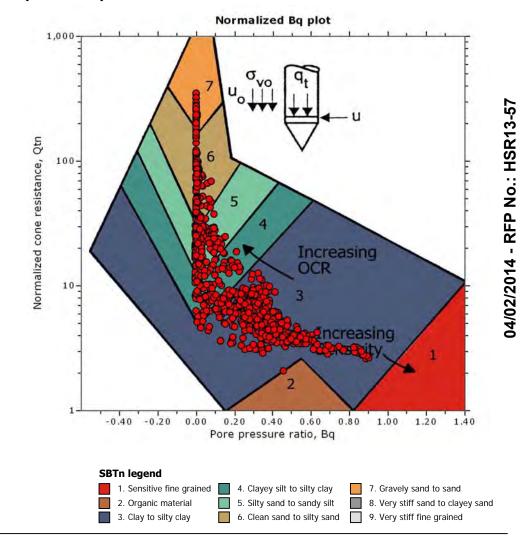
Surface Elevation: 194.03 ft

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







**Project: California High-Speed Train** 

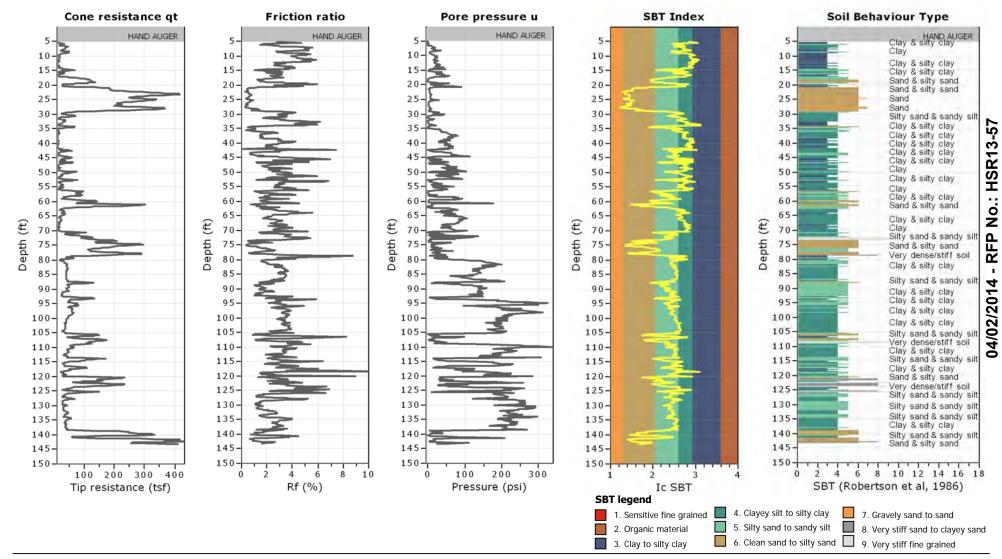
Location: Fresno-Bakersfield

CPT: S0214CPT

Total depth: 143.37 ft

Surface Elevation: 194.03 ft

Coords: X:6431891.18, Y:1860287.60





www.hsr.ca.gov

**Project: California High-Speed Train** 

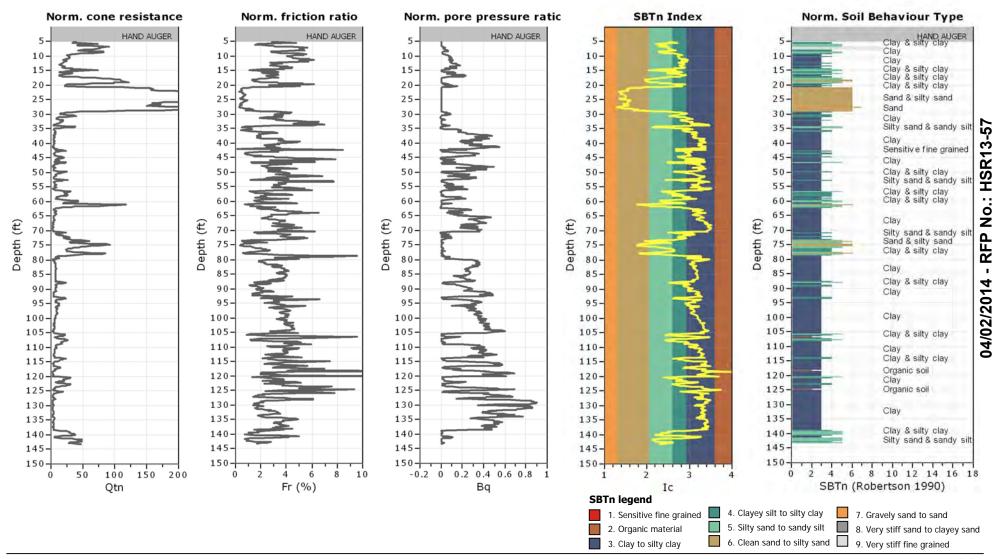
Location: Fresno-Bakersfield

**CPT: S0214CPT** 

Total depth: 143.37 ft

Surface Elevation: 194.03 ft

Coords: X:6431891.18, Y:1860287.60



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

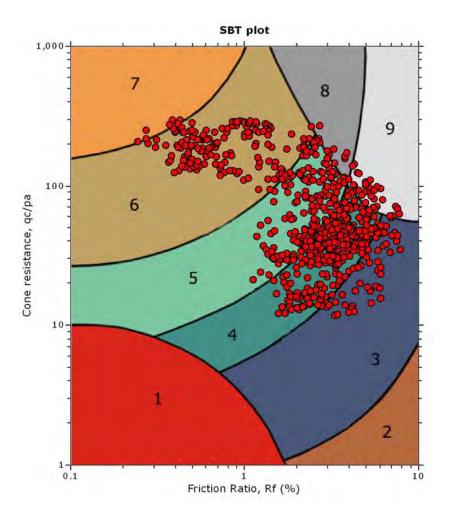
CPT: S0216CPT

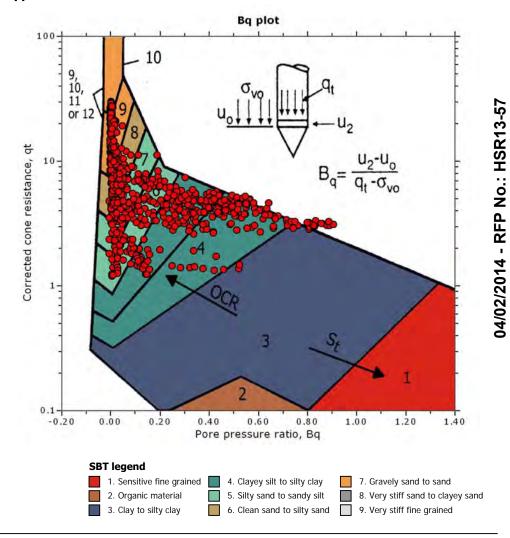
Total depth: 133.53 ft

Surface Elevation: 193.12 ft

Coords: X:6434743.41, Y:1855451.16

Cone Operator: Unknown

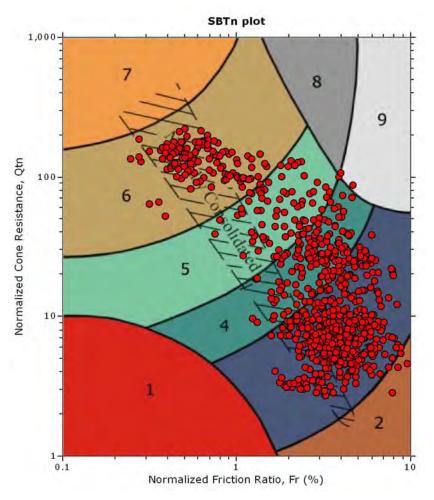


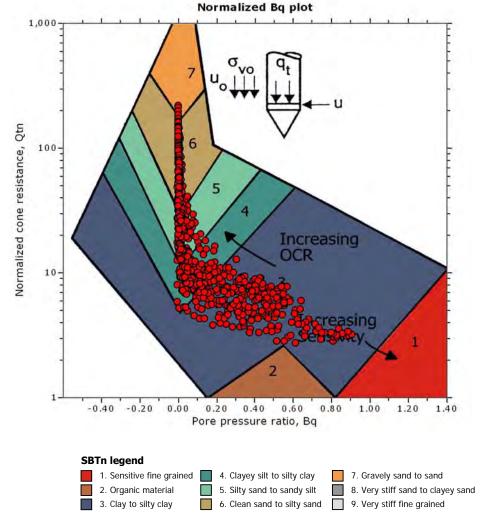




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







**Project: California High-Speed Train** 

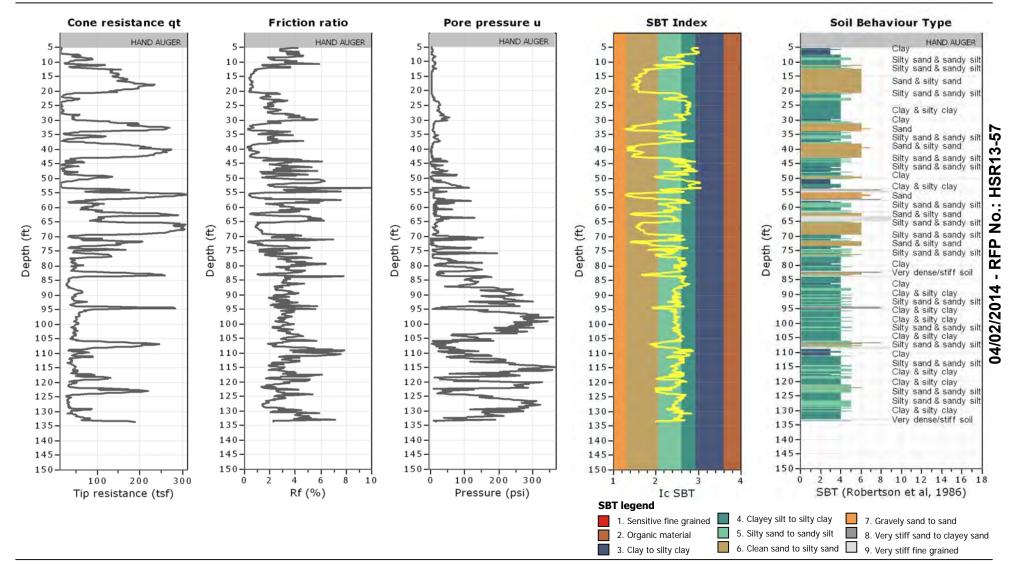
Location: Fresno-Bakersfield

CPT: S0216CPT

Total depth: 133.53 ft

Surface Elevation: 193.12 ft

Coords: X:6434743.41, Y:1855451.16





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**Project: California High-Speed Train** 

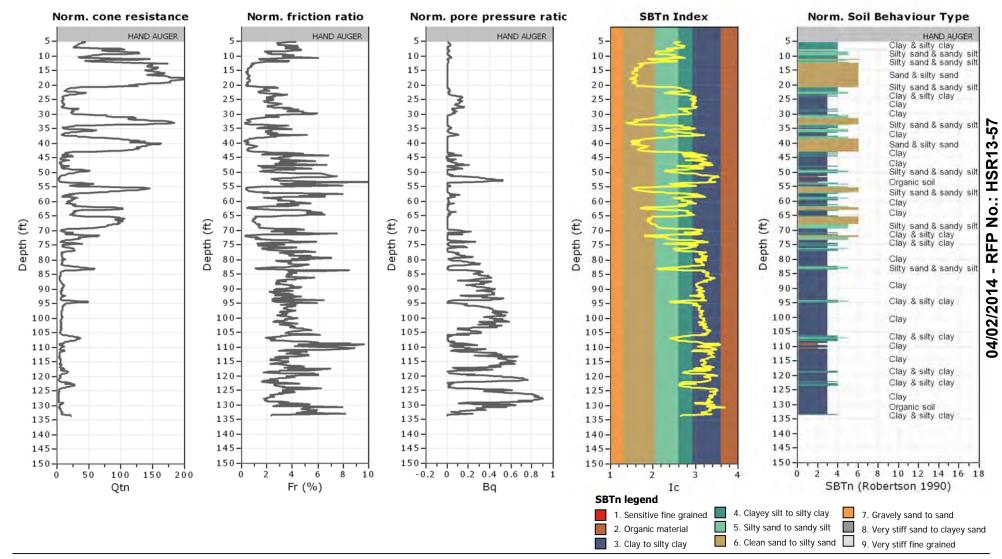
Location: Fresno-Bakersfield

CPT: S0216CPT

Total depth: 133.53 ft

Surface Elevation: 193.12 ft

Coords: X:6434743.41, Y:1855451.16



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

1,000-

100-

0.1

Cone resistance, qc/pa

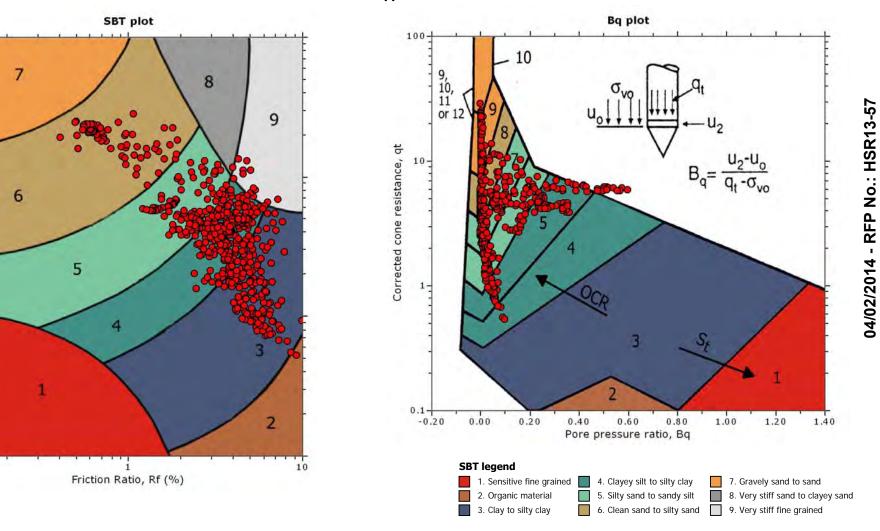
CPT: S0218CPT

Total depth: 100.23 ft

Surface Elevation: 193.06 ft

Coords: X:6436021.80, Y:1853397.01

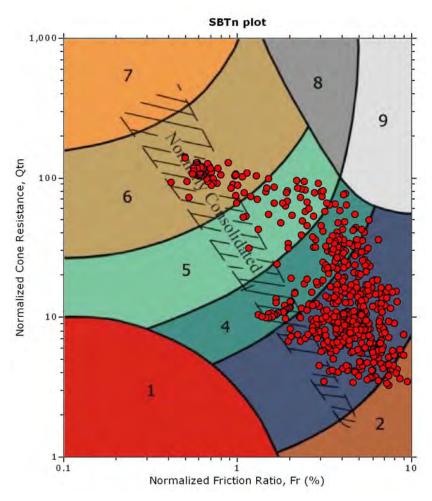
Cone Operator: Unknown

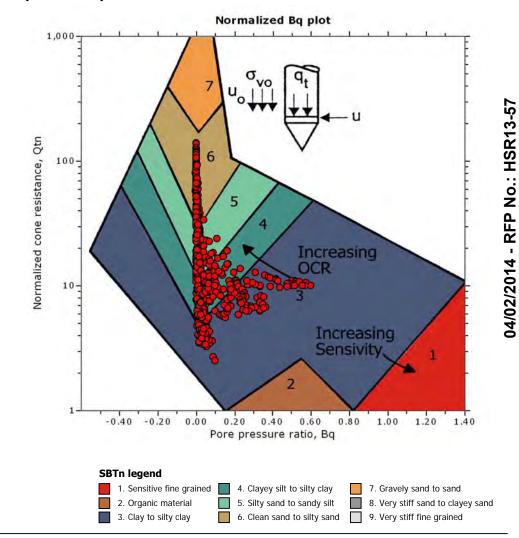




**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

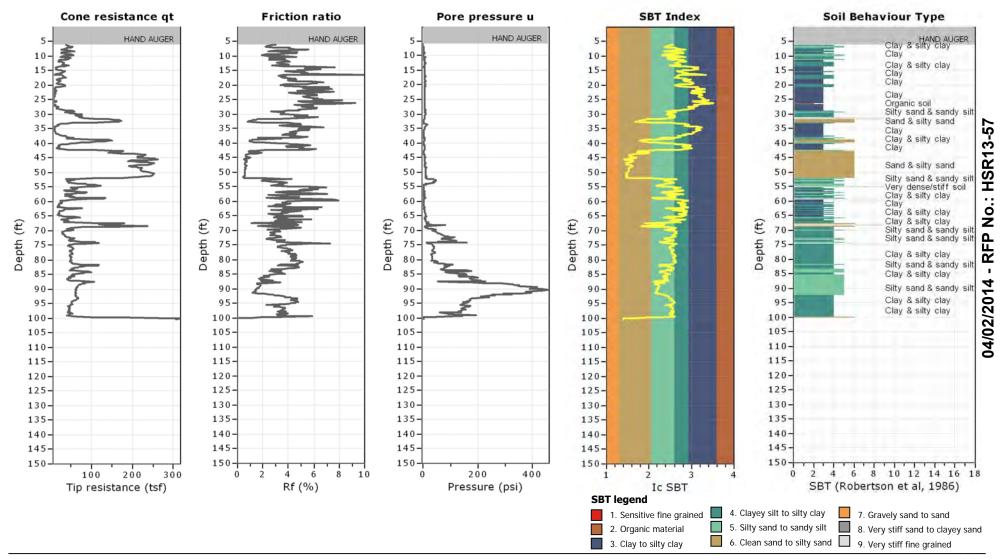
Location: Fresno-Bakersfield

CPT: S0218CPT

Total depth: 100.23 ft

Surface Elevation: 193.06 ft

Coords: X:6436021.80, Y:1853397.01





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**Project: California High-Speed Train** 

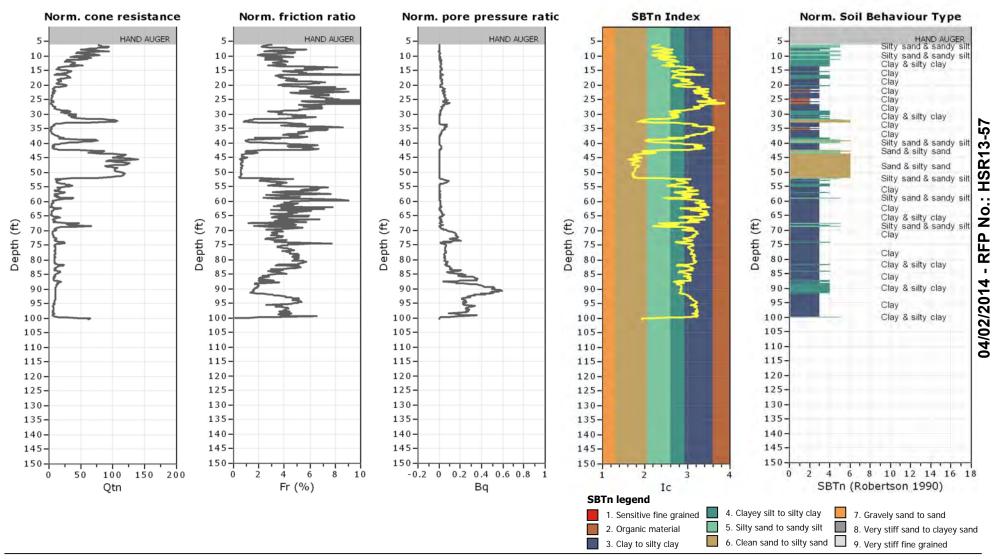
Location: Fresno-Bakersfield

CPT: S0218CPT

Total depth: 100.23 ft

Surface Elevation: 193.06 ft

Coords: X:6436021.80, Y:1853397.01



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

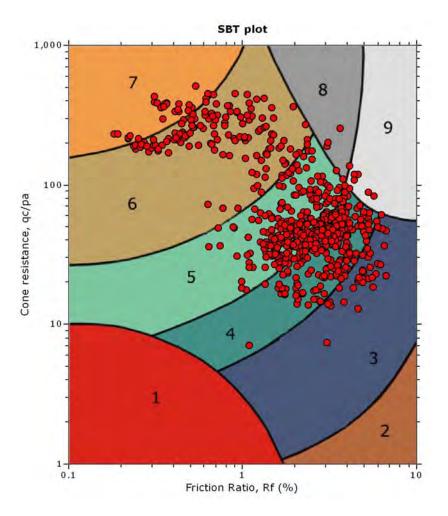
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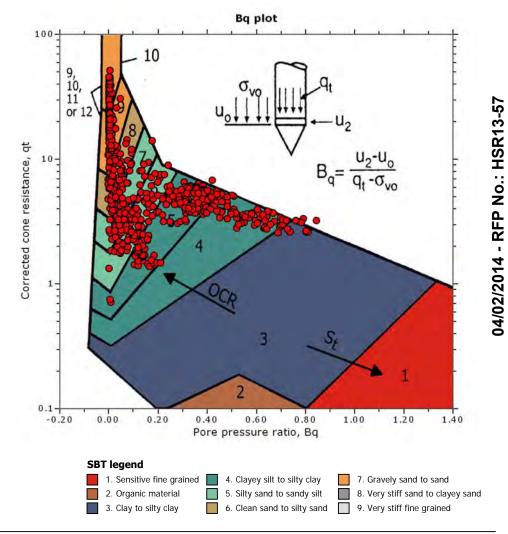
Total depth: 120.24 ft

Surface Elevation: 196.00 ft

Coords: X:6437983.99, Y:1849936.20

Cone Operator: Unknown





**Project: California High-Speed Train** 

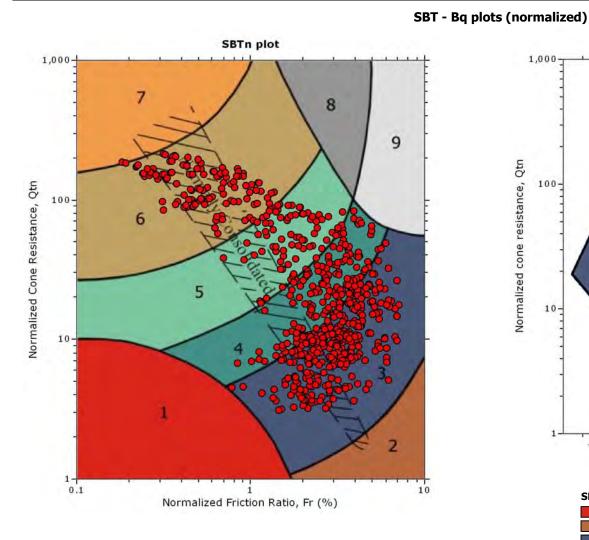
Location: Fresno-Bakersfield

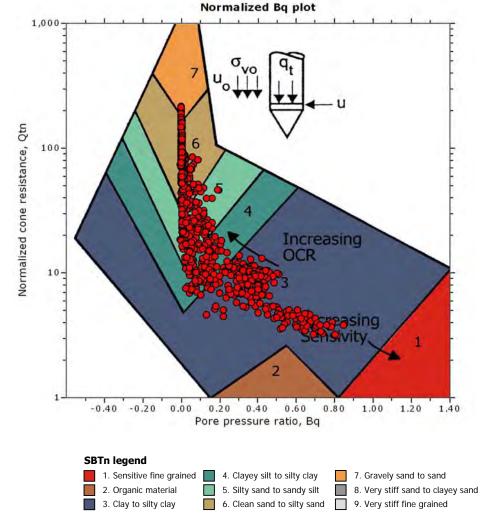
CPT: S0220CPT

Total depth: 120.24 ft

Surface Elevation: 196.00 ft

Coords: X:6437983.99, Y:1849936.20 Cone Operator: Unknown







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**Project: California High-Speed Train** 

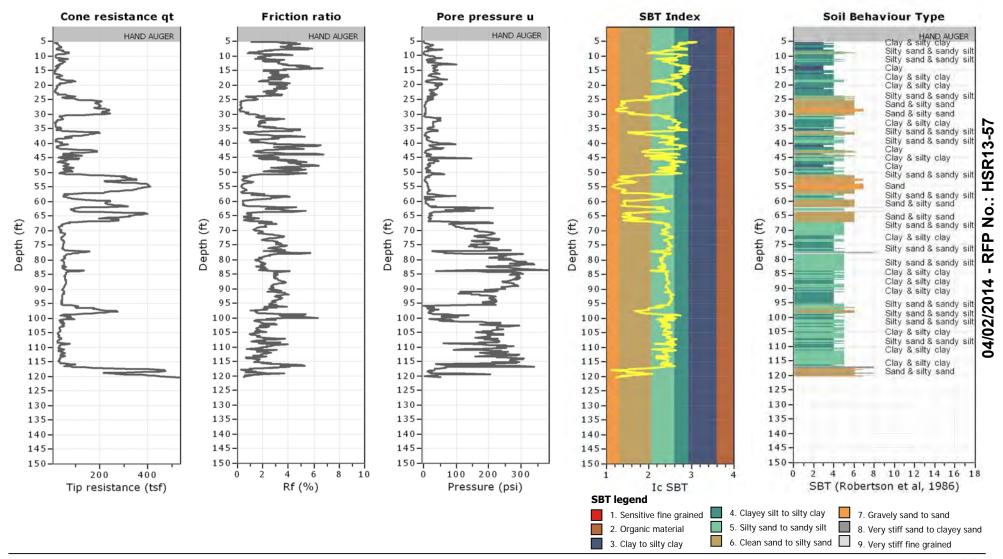
Location: Fresno-Bakersfield

CPT: S0220CPT

Total depth: 120.24 ft

Surface Elevation: 196.00 ft

Coords: X:6437983.99, Y:1849936.20





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**Project: California High-Speed Train** 

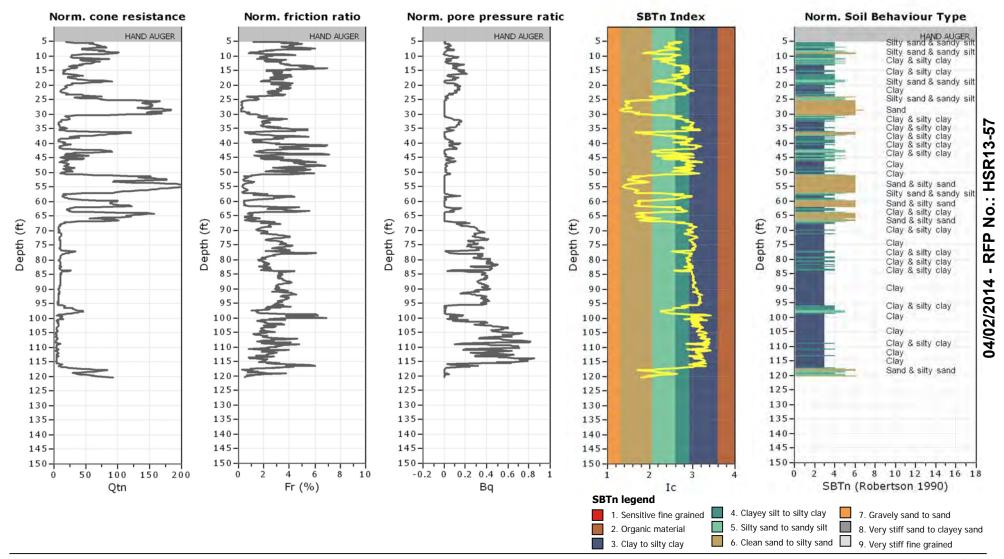
Location: Fresno-Bakersfield

CPT: S0220CPT

Total depth: 120.24 ft

Surface Elevation: 196.00 ft

Coords: X:6437983.99, Y:1849936.20



Project: California High-Speed Train

Location: Fresno-Bakersfield

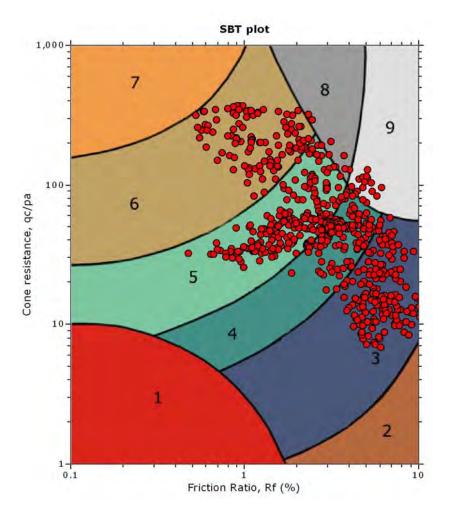
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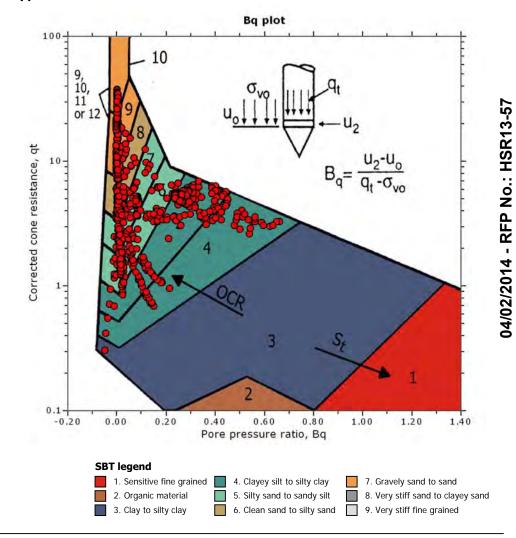
Total depth: 116.31 ft

Surface Elevation: 196.98 ft

Coords: X:6438630.09, Y:1848809.96

Cone Operator: Unknown



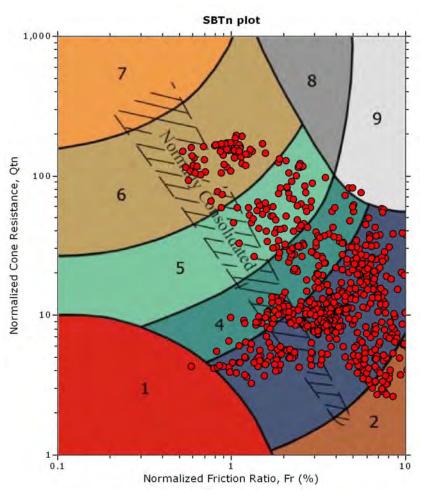


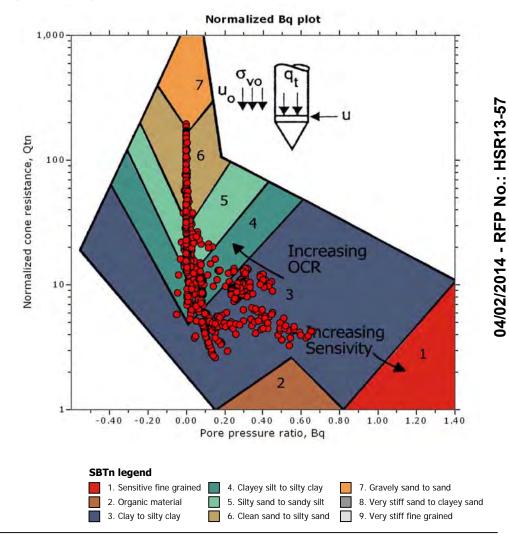
**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 

Total depth: 116.31 ft Surface Elevation: 196.98 ft Coords: X:6438630.09, Y:1848809.96

Cone Operator: Unknown







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**Project: California High-Speed Train** 

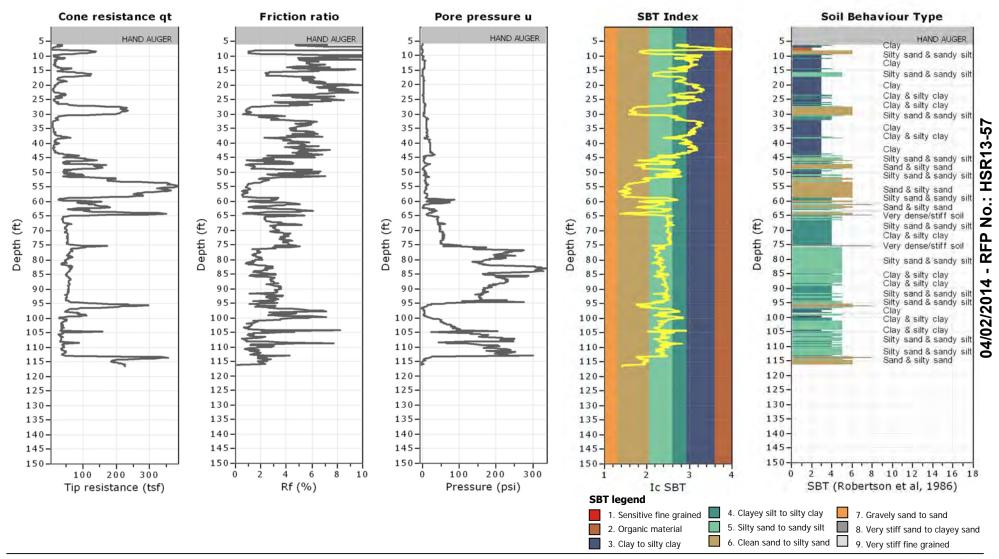
Location: Fresno-Bakersfield

CPT: S0221CPT

Total depth: 116.31 ft

Surface Elevation: 196.98 ft

Coords: X:6438630.09, Y:1848809.96





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**Project: California High-Speed Train** 

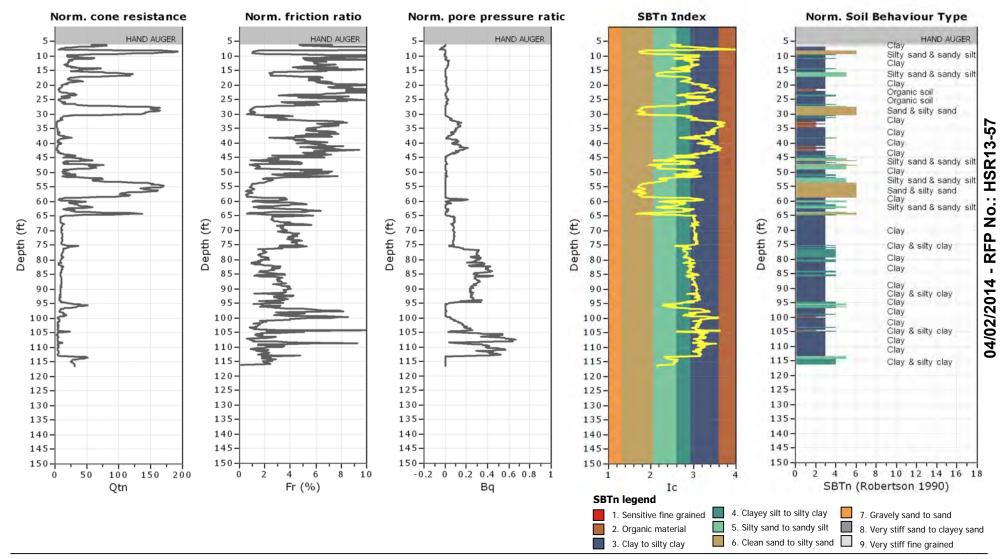
Location: Fresno-Bakersfield

CPT: S0221CPT

Total depth: 116.31 ft

Surface Elevation: 196.98 ft

Coords: X:6438630.09, Y:1848809.96



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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

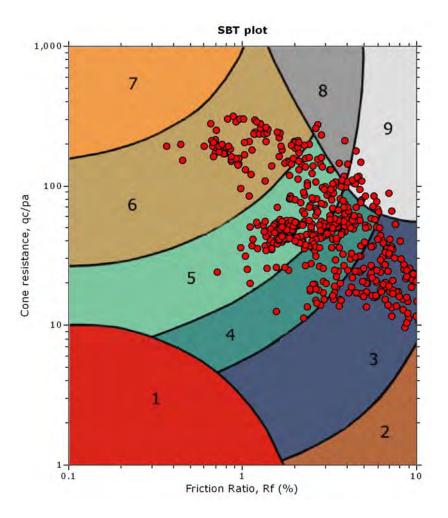
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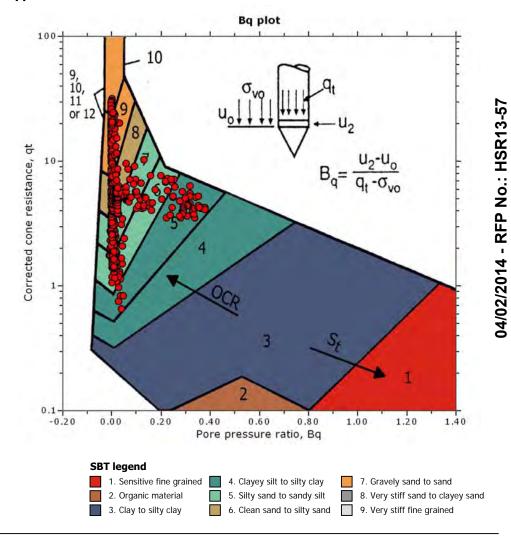
Total depth: 93.83 ft

Surface Elevation: 213.00 ft

Coords: X:6439406.05, Y:1847496.06

Cone Operator: Unknown



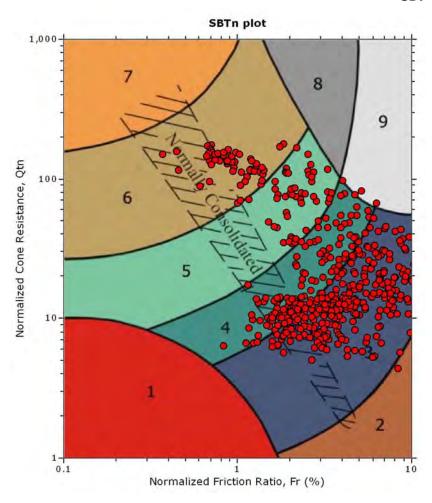


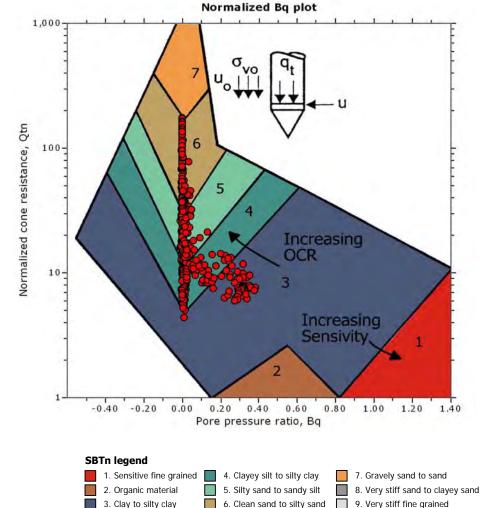
# URS HMM ARUP

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**Project: California High-Speed Train** 

Location: Fresno-Bakersfield







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**Project: California High-Speed Train** 

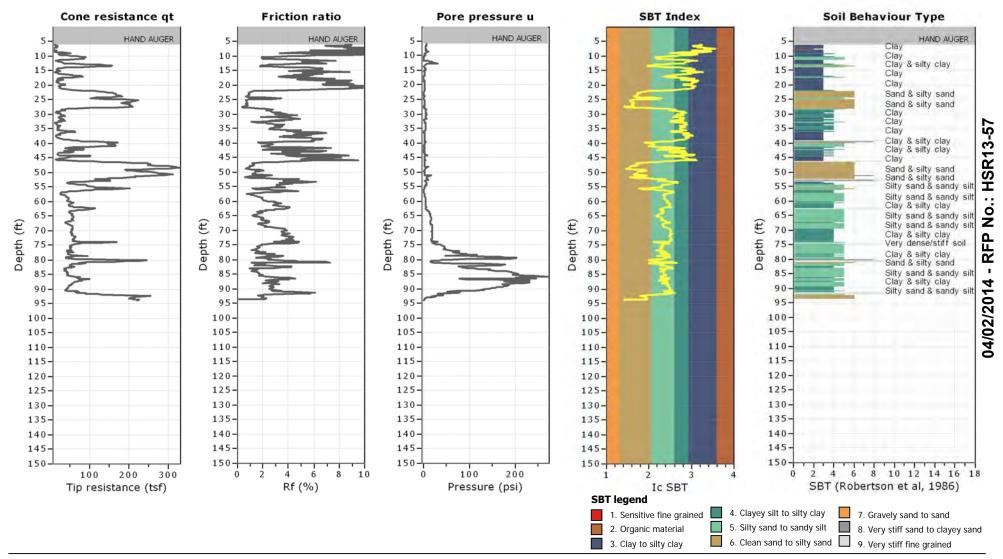
Location: Fresno-Bakersfield

CPT: S0222CPT

Total depth: 93.83 ft

Surface Elevation: 213.00 ft

Coords: X:6439406.05, Y:1847496.06





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**Project: California High-Speed Train** 

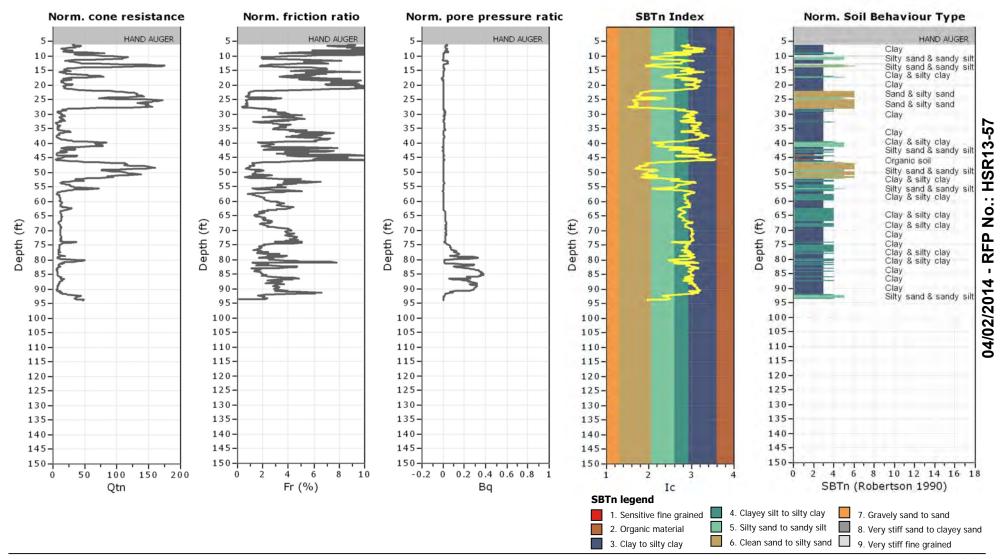
Location: Fresno-Bakersfield

CPT: S0222CPT

Total depth: 93.83 ft

Surface Elevation: 213.00 ft

Coords: X:6439406.05, Y:1847496.06



Project: California High-Speed Train

Location: Fresno-Bakersfield

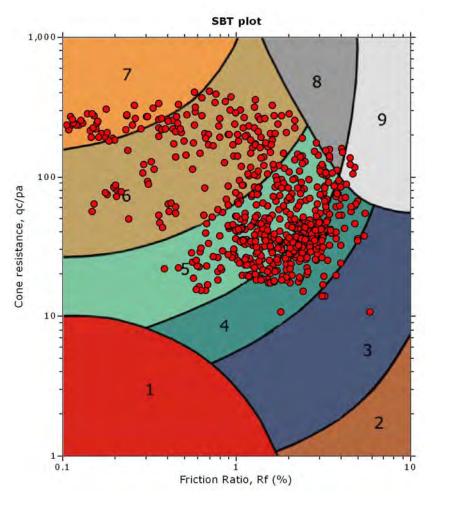
CPT: S0225CPT

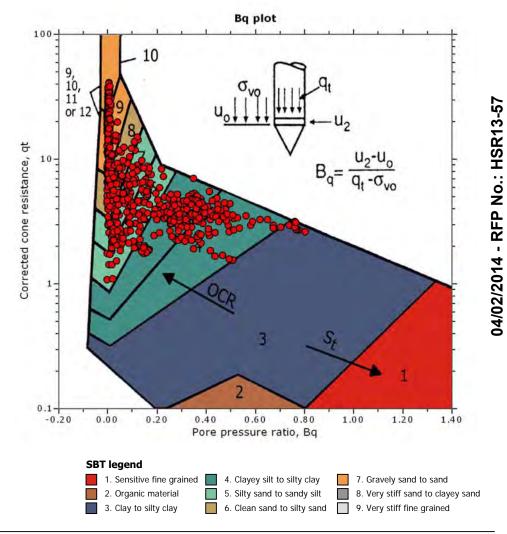
Total depth: 117.29 ft

Surface Elevation: 208.00 ft

Coords: X:6440869.67, Y:1843834.82

Cone Operator: Unknown







**Project: California High-Speed Train** 

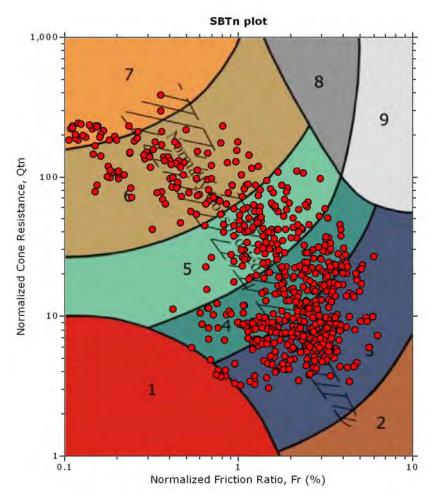
**Location: Fresno-Bakersfield** 

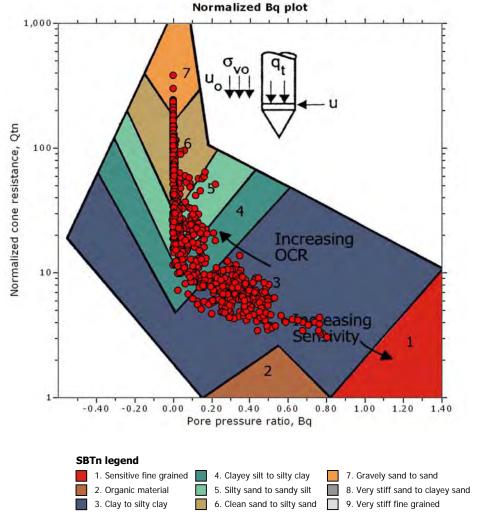
### CPT: S0225CPT

Total depth: 117.29 ft Surface Elevation: 208.00 ft

Coords: X:6440869.67, Y:1843834.82

Cone Operator: Unknown







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**Project: California High-Speed Train** 

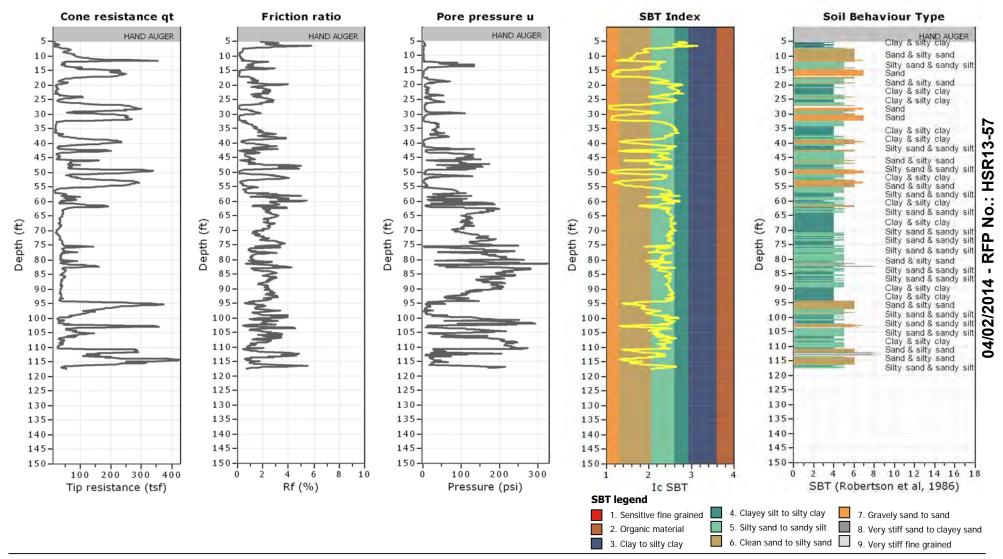
Location: Fresno-Bakersfield

CPT: S0225CPT

Total depth: 117.29 ft

Surface Elevation: 208.00 ft

Coords: X:6440869.67, Y:1843834.82





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**Project: California High-Speed Train** 

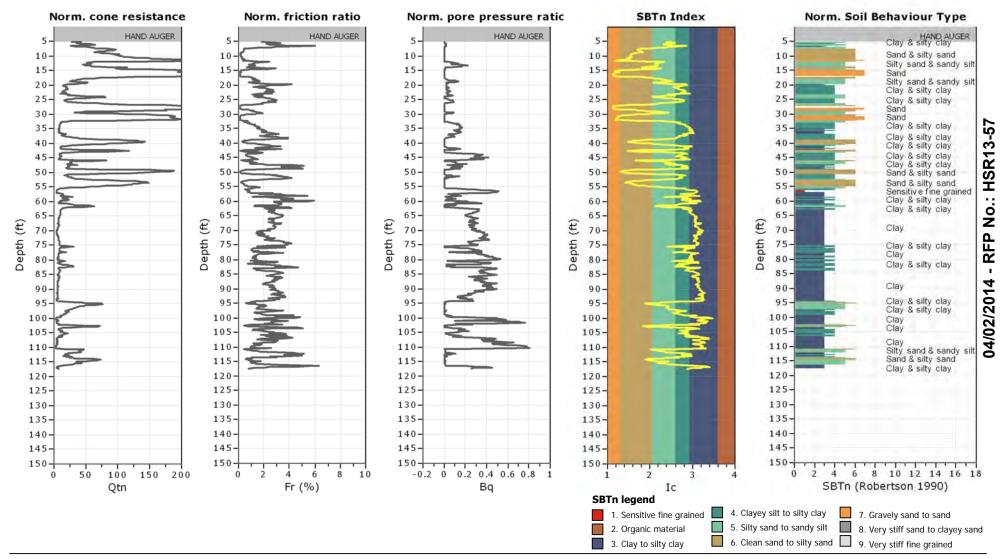
Location: Fresno-Bakersfield

CPT: S0225CPT

Total depth: 117.29 ft

Surface Elevation: 208.00 ft

Coords: X:6440869.67, Y:1843834.82



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

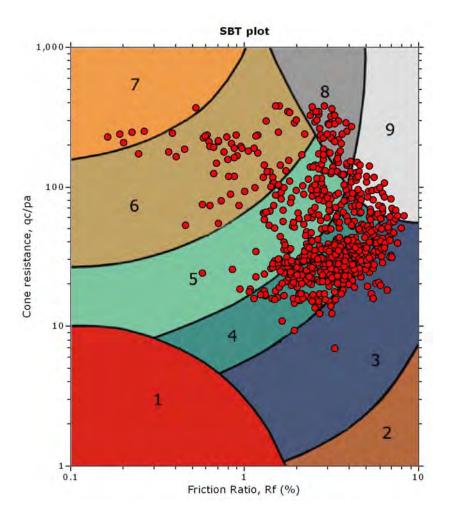
CPT: S0226CPT

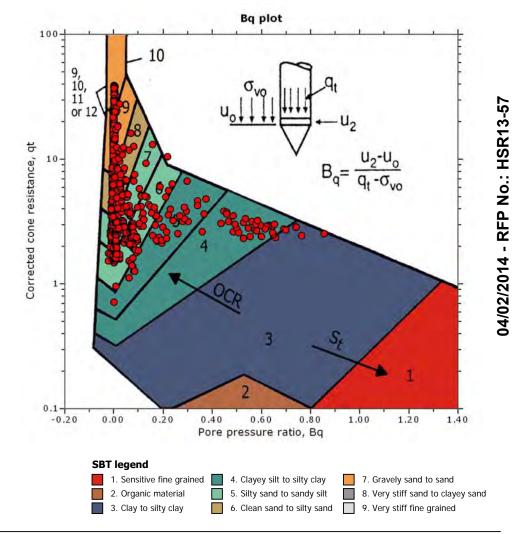
Total depth: 123.69 ft

Surface Elevation: 194.33 ft

Coords: X:6439136.99, Y:1843824.39

Cone Operator: Unknown





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

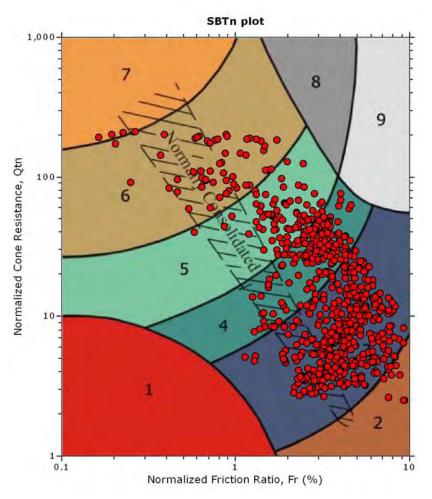
CPT: S0226CPT

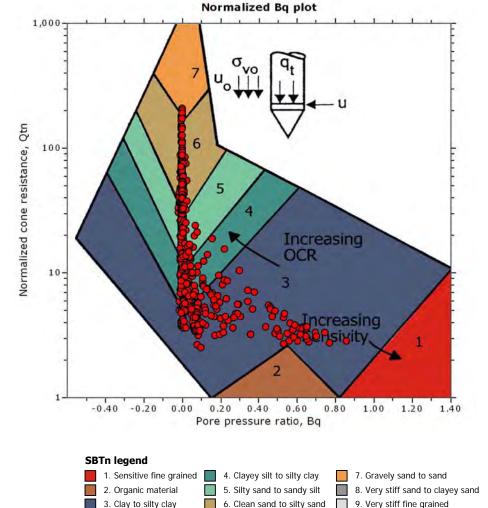
Total depth: 123.69 ft

Surface Elevation: 194.33 ft

Coords: X:6439136.99, Y:1843824.39

Cone Operator: Unknown







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**Project: California High-Speed Train** 

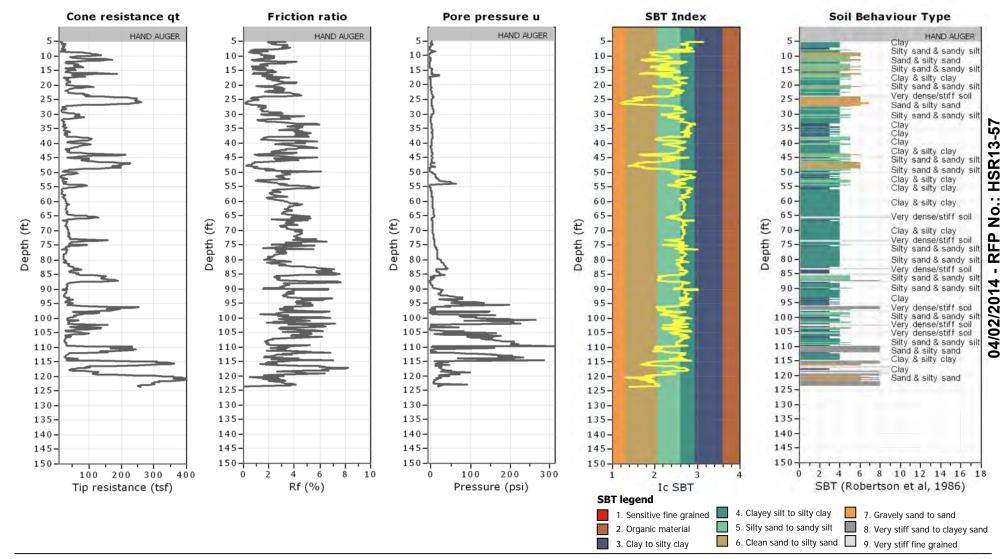
Location: Fresno-Bakersfield

CPT: S0226CPT

Total depth: 123.69 ft

Surface Elevation: 194.33 ft

Coords: X:6439136.99, Y:1843824.39





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**Project: California High-Speed Train** 

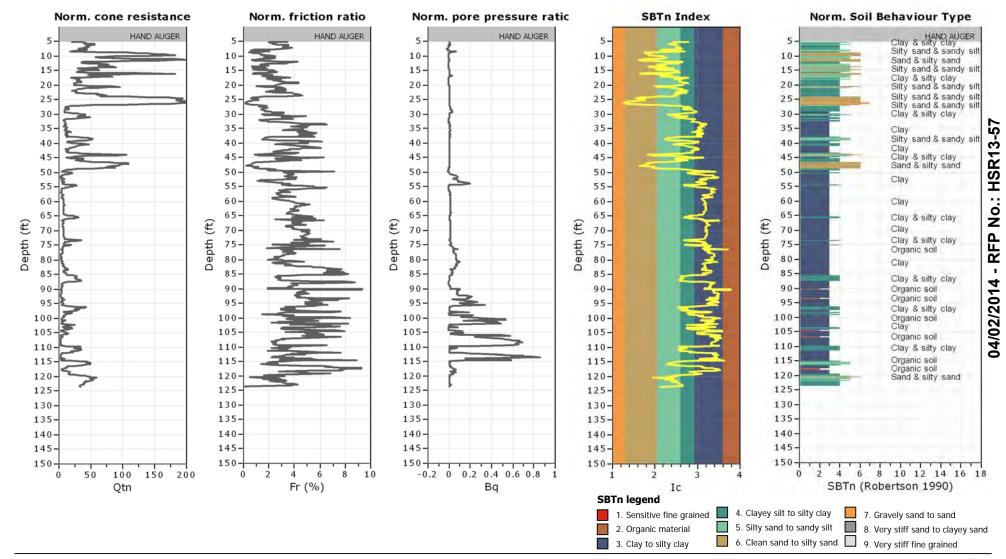
Location: Fresno-Bakersfield

CPT: S0226CPT

Total depth: 123.69 ft

Surface Elevation: 194.33 ft

Coords: X:6439136.99, Y:1843824.39



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

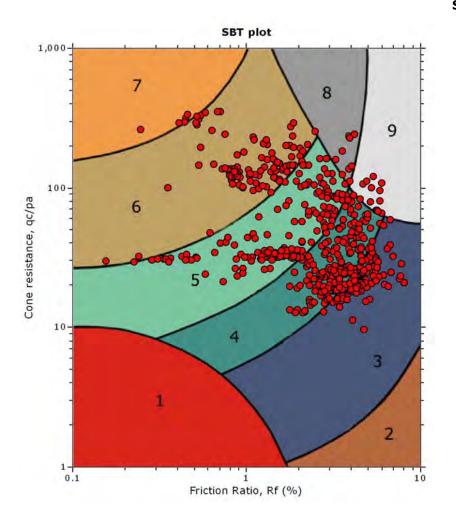
CPT: S0230CPT

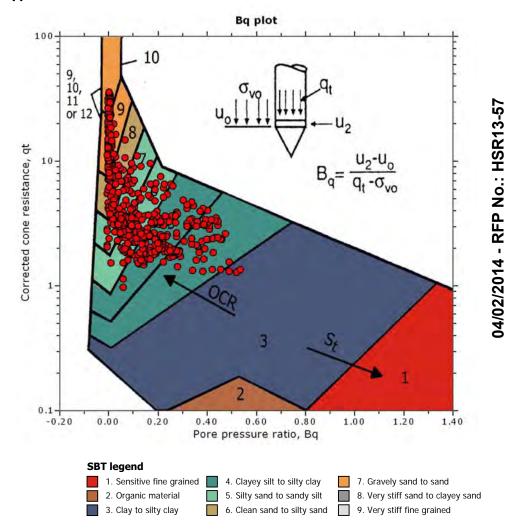
Total depth: 102.85 ft

Surface Elevation: 213.00 ft

Coords: X:6444704.13, Y:1838600.97

Cone Operator: Unknown





**Project: California High-Speed Train** 

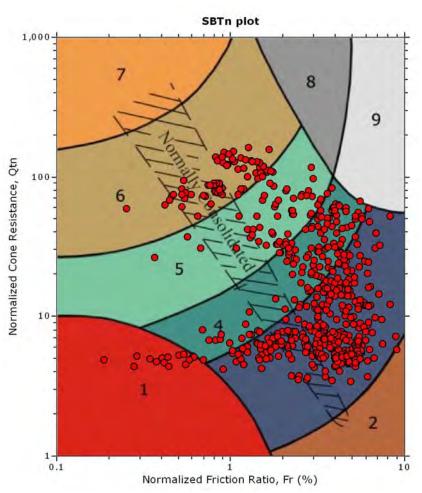
Location: Fresno-Bakersfield

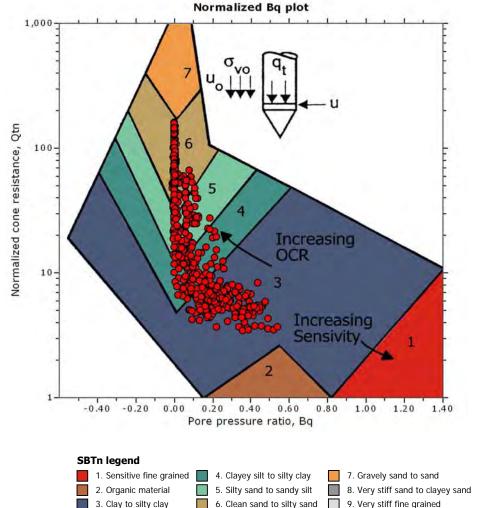
#### CPT: S0230CPT

Total depth: 102.85 ft

Surface Elevation: 213.00 ft Coords: X:6444704.13, Y:1838600.97

Cone Operator: Unknown







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**Project: California High-Speed Train** 

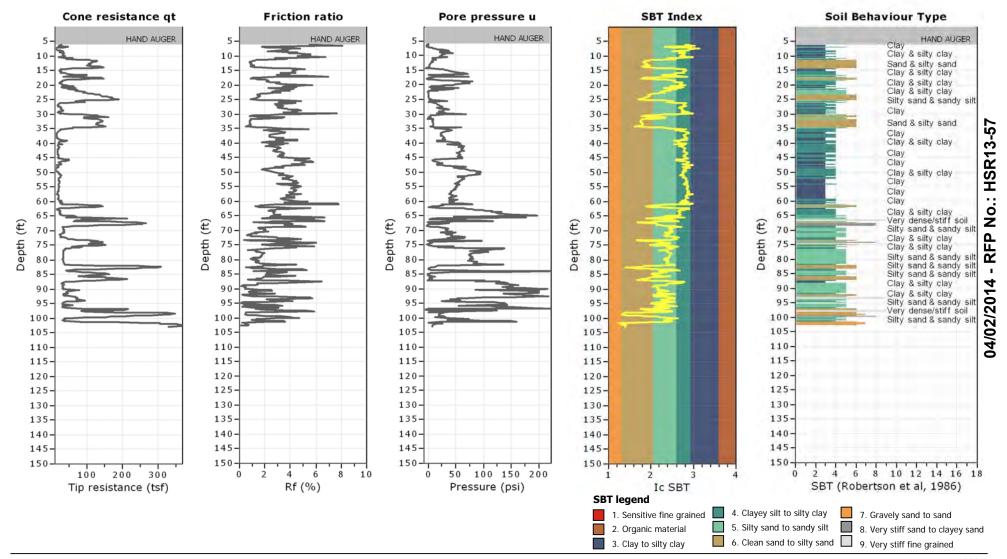
Location: Fresno-Bakersfield

CPT: S0230CPT

Total depth: 102.85 ft

Surface Elevation: 213.00 ft

Coords: X:6444704.13, Y:1838600.97





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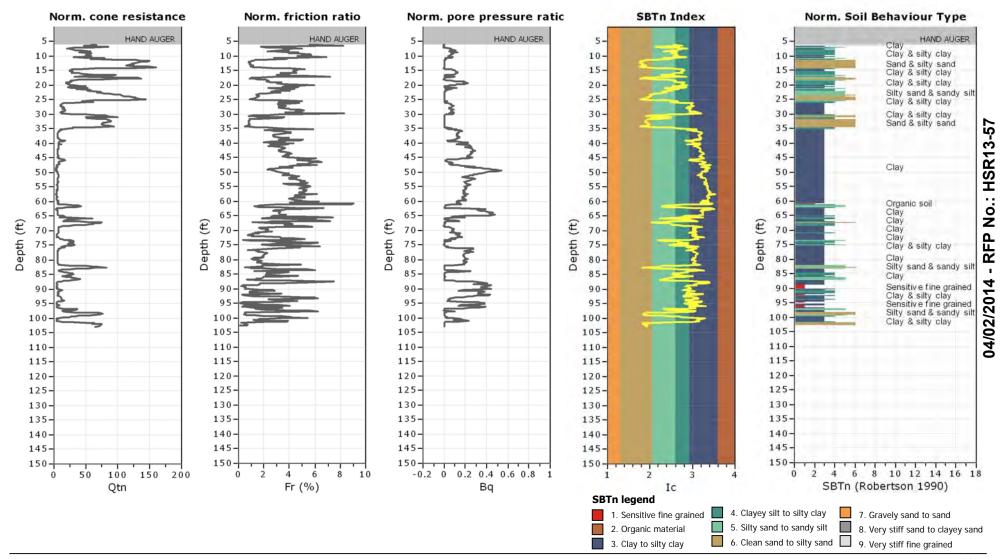
Location: Fresno-Bakersfield

CPT: S0230CPT

Total depth: 102.85 ft

Surface Elevation: 213.00 ft

Coords: X:6444704.13, Y:1838600.97



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Location: Fresno-Bakersfield

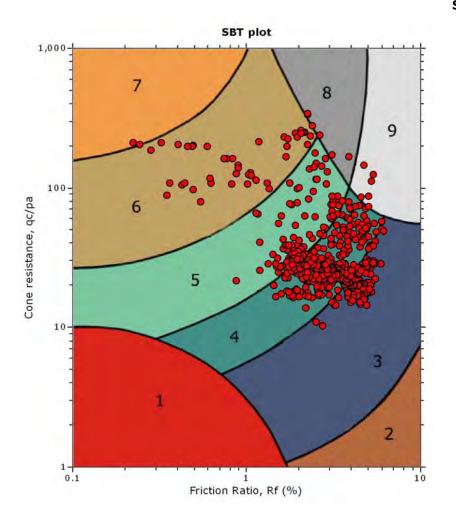
CPT: S0237CPT

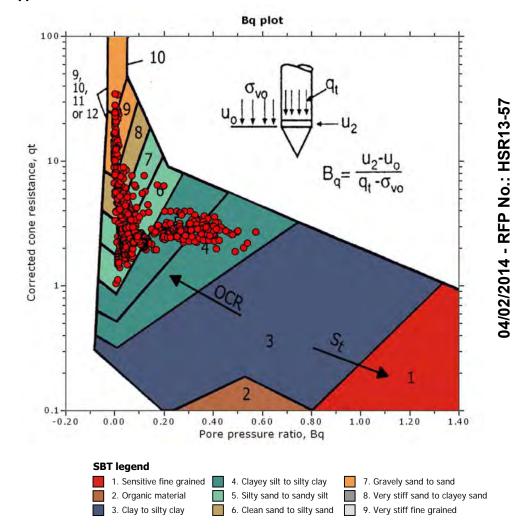
Total depth: 100.39 ft

Surface Elevation: 211.00 ft

Coords: X:6445187.76, Y:1827909.22

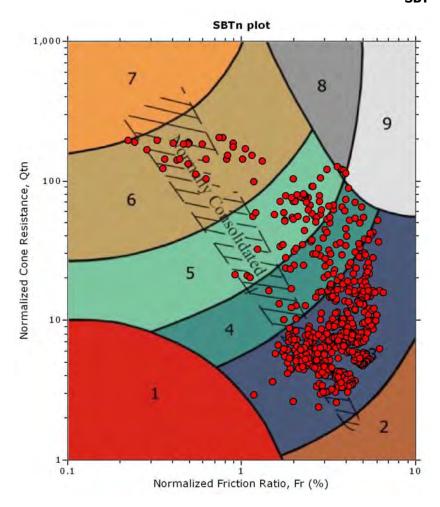
Cone Operator: Unknown

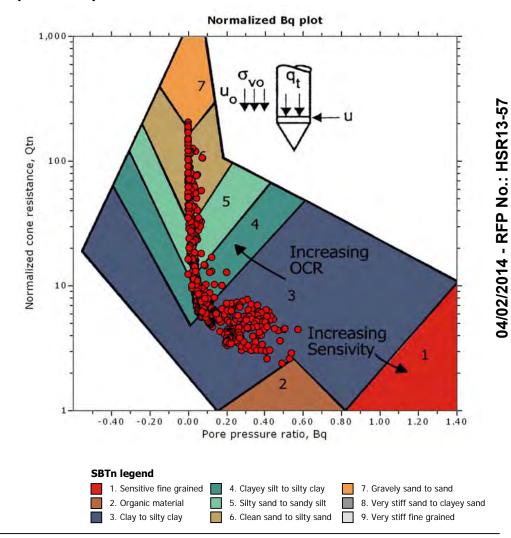




**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







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**Project: California High-Speed Train** 

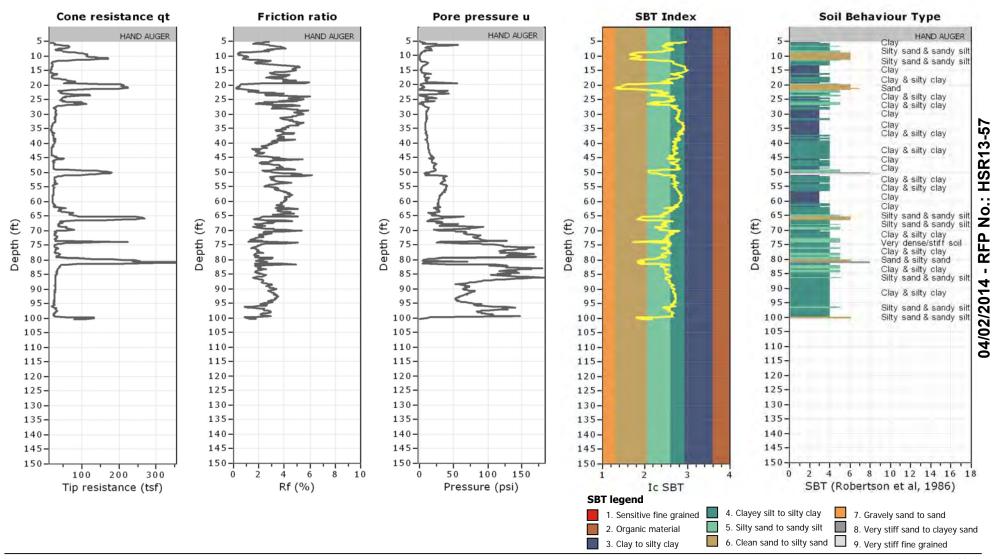
Location: Fresno-Bakersfield

**CPT: S0237CPT** 

Total depth: 100.39 ft

Surface Elevation: 211.00 ft

Coords: X:6445187.76, Y:1827909.22





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**Project: California High-Speed Train** 

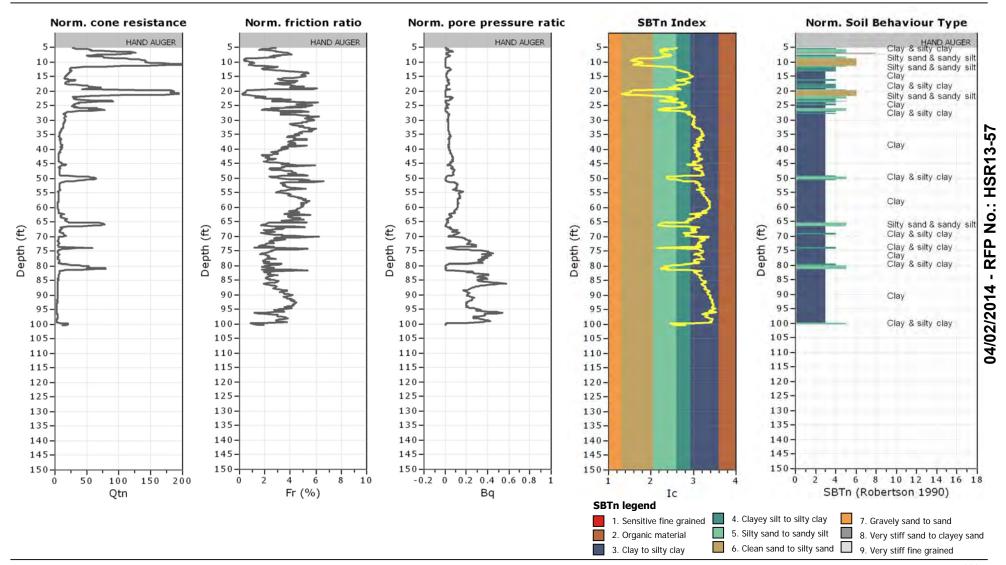
Location: Fresno-Bakersfield

CPT: S0237CPT

Total depth: 100.39 ft

Surface Elevation: 211.00 ft

Coords: X:6445187.76, Y:1827909.22



Project: California High-Speed Train

Location: Fresno-Bakersfield

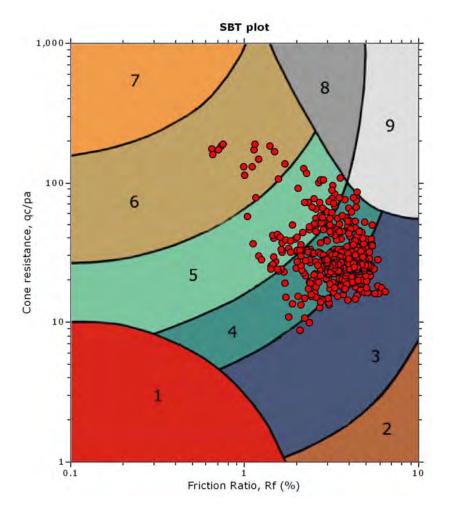
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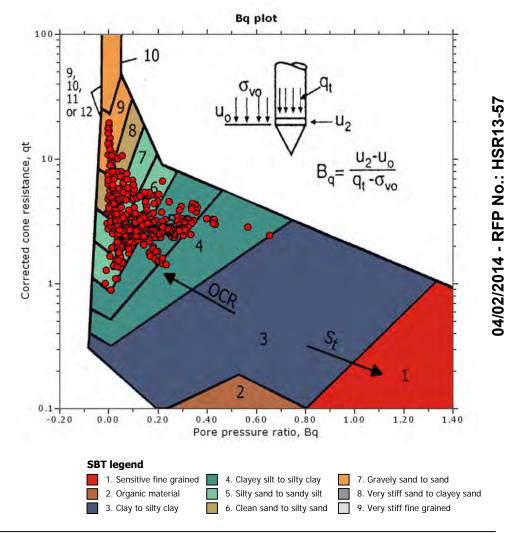
Total depth: 100.07 ft

Surface Elevation: 218.00 ft

Coords: X:6445218.36, Y:1822783.73

Cone Operator: Unknown



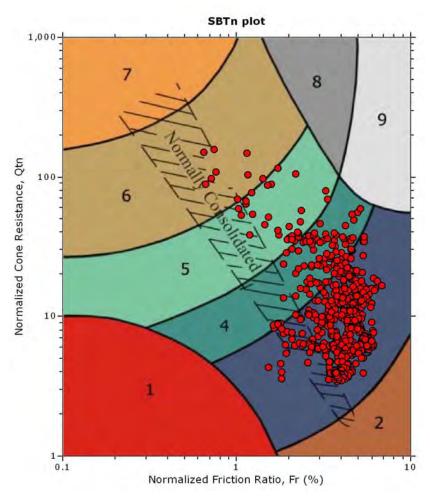


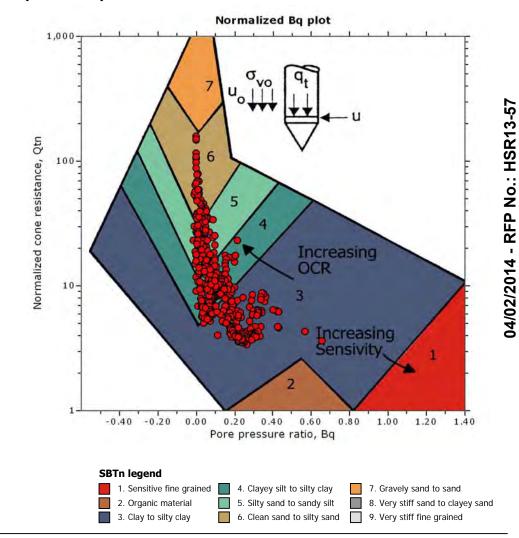
Coords: X:6445218.36, Y:1822783.73

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**Project: California High-Speed Train** 

**Location: Fresno-Bakersfield** 







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**Project: California High-Speed Train** 

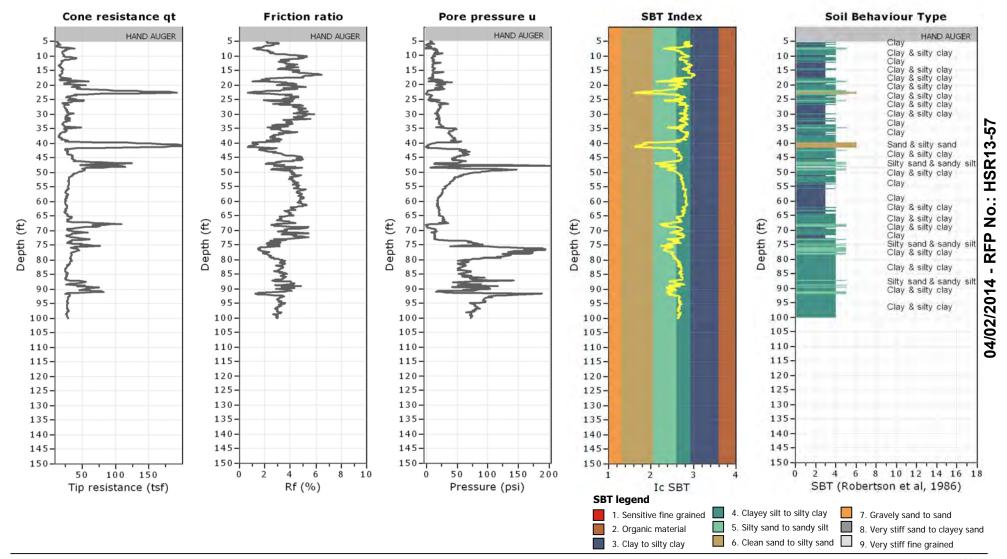
Location: Fresno-Bakersfield

CPT: S0239CPT

Total depth: 100.07 ft

Surface Elevation: 218.00 ft

Coords: X:6445218.36, Y:1822783.73





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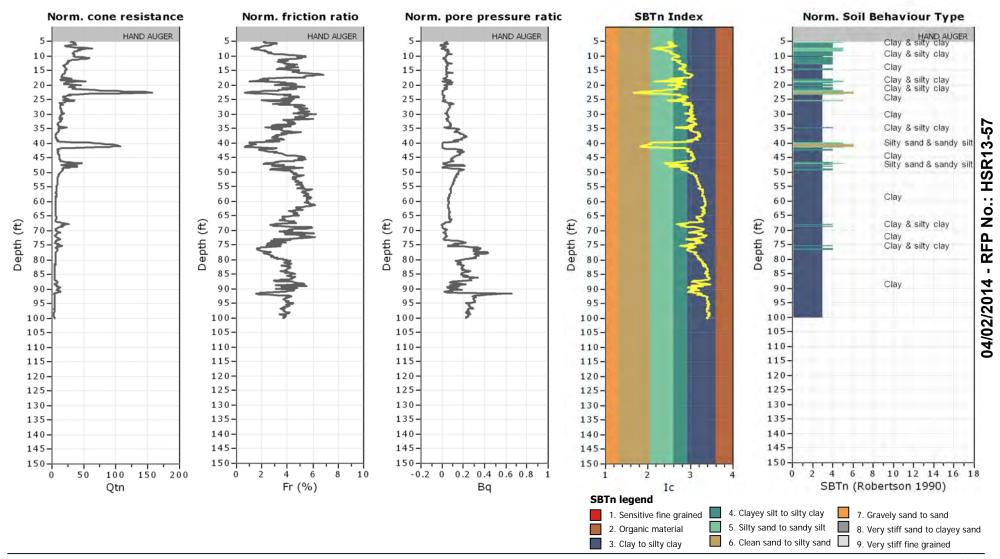
**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

CPT: S0239CPT

Total depth: 100.07 ft Surface Elevation: 218.00 ft

Coords: X:6445218.36, Y:1822783.73



**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

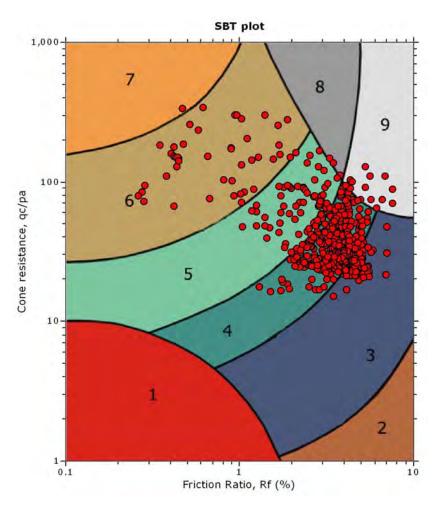
CPT: S0241CPT

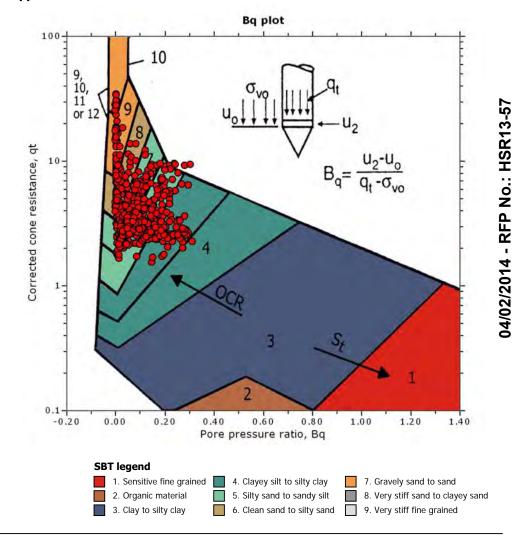
Total depth: 100.23 ft

Surface Elevation: 227.00 ft

Coords: X:6445114.72, Y:1812307.68

Cone Operator: Unknown





**Project: California High-Speed Train** 

Location: Fresno-Bakersfield

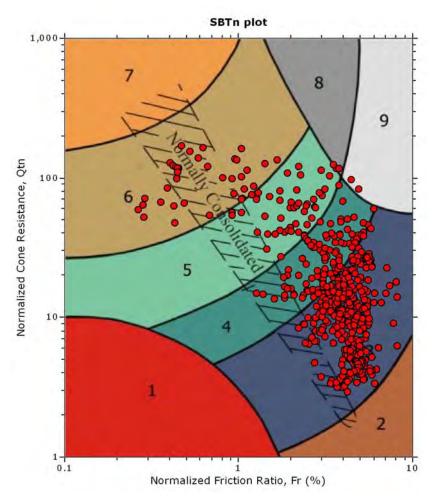
CPT: S0241CPT

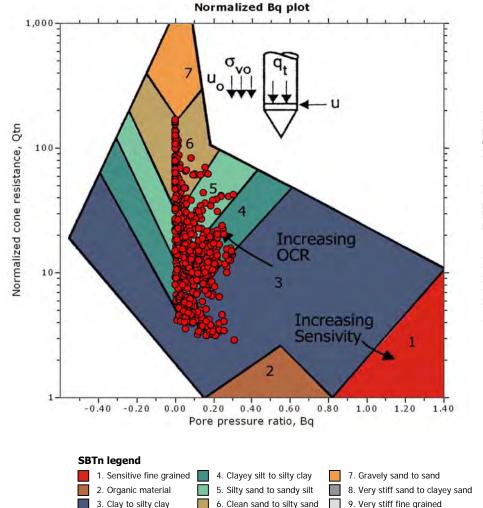
Total depth: 100.23 ft

Surface Elevation: 227.00 ft

Coords: X:6445114.72, Y:1812307.68

Cone Operator: Unknown







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**Project: California High-Speed Train** 

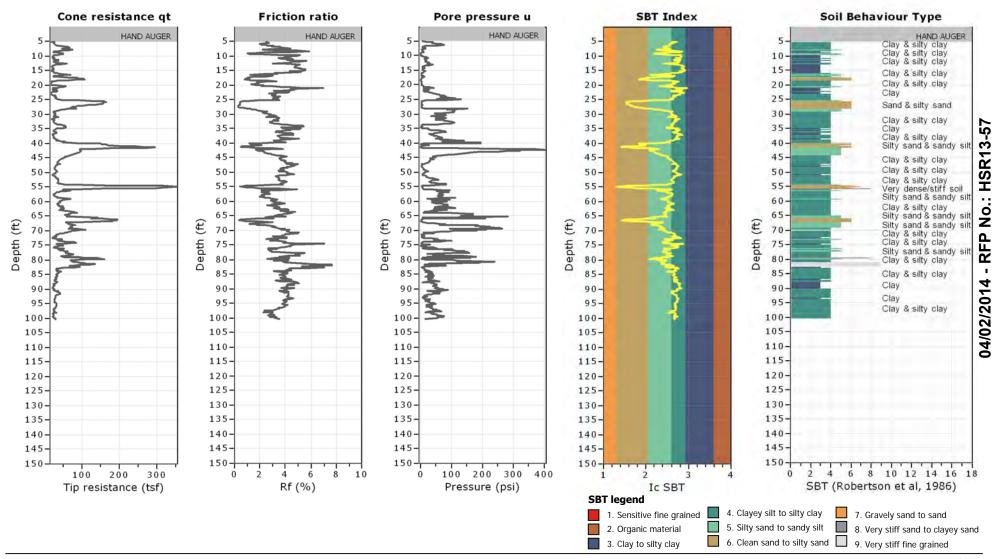
Location: Fresno-Bakersfield

CPT: S0241CPT

Total depth: 100.23 ft

Surface Elevation: 227.00 ft

Coords: X:6445114.72, Y:1812307.68





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**Project: California High-Speed Train** 

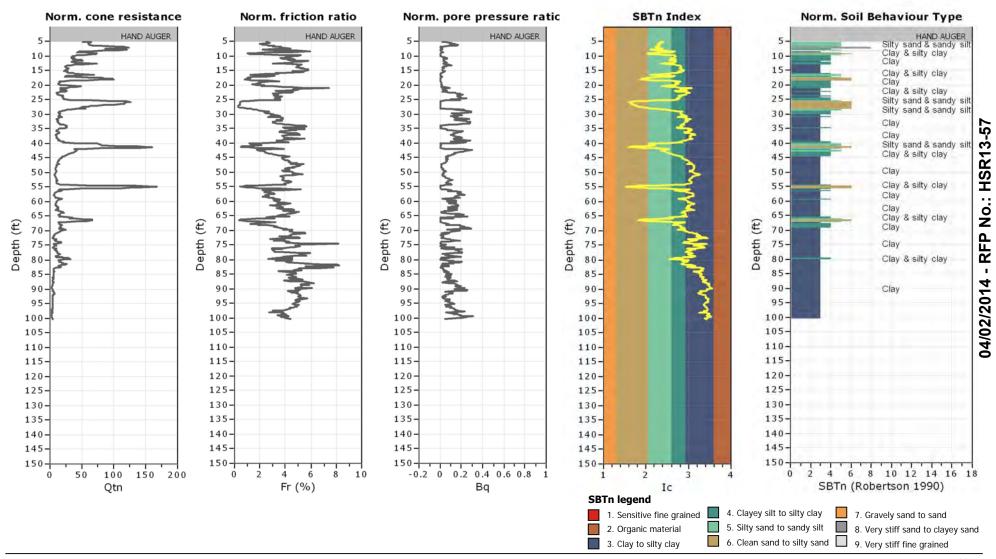
Location: Fresno-Bakersfield

CPT: S0241CPT

Total depth: 100.23 ft

Surface Elevation: 227.00 ft

Coords: X:6445114.72, Y:1812307.68



Appendix D
PS Logging Records —

GEOVision Geophysical Services

For Report PDF, see CD

**Table D-1**Summary of PS Logging Locations, Depths, and Dates Logged

						Depth Interval <sup>[1]</sup>		
Borehole ID	Date Logged	Northing NAD 83 (ft)	Easting NAD 83 (ft)	Elevation NAVD88 (ft)	Total Depth of Drilling (ft)	Top Depth (ft)	Bottom Depth (ft)	
S0028R	9/4/2013	6,348,973	2,072,585	261.2	165.0	9.8	152.6	
S0067R	9/9/2013	6,407,179	1,902,052	194.1	165.0	3.3	152.6	
S0072R	10/4/2013	6,437,979	1,849,931	196.0	165.0	4.9	152.6	

<sup>[1]</sup> Logging performed at 1.6-foot intervals between top and bottom depths



Appendix E Laboratory Test Records

For Lab Data, see CD

**Table E-1**Laboratory Index and Chemistry Test Quantities

Test Type	ASTM Standard	No. of Tests
Moisture Test	ASTM D 2216	227
Dry Density	ASTM D2937	155
Atterberg Limit	ASTM D 4318	77
Organics	ASTM D 2974	1
Particle-Size Analysis	ASTM D 422	168
Soils Finer than the No. 200 Sieve	ASTM D 1140	168
Soil Resistivity	ASTM G 57	5
Soil Corrosivity (pH, Chloride, Sulfate)	ASTM D4327	5
Modified Proctor	ASTM D1557	17
California Bearing Ratio	ASTM D1883	6
Groundwater Chemistry (pH, Calcium, CACO <sub>3</sub> , Specific Conductance, Total Dissolved Solids Sulfate)	SM 4500-H+B, EPA 200.7, SM 2320B, SM 2510B, EPA 300.0	4



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>	Liquid Limt W <sub>I</sub>	Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0019AR	MC-01	6	281.89	SM	7.2					
S0019AR	SS-02	10.5	277.39	ML					59.4	
S0019AR	MC-03	15.5	272.39	SP	14.9				3.6	
S0019AR	MC-03	16	271.89	SP	7.2					
S0019AR	MC-05	26	261.89	SM	14.6				29.3	
S0019AR	SS-06	30	257.89	SP-SM	10.2				7.5	
S0019AR	MC-07	36	251.89	SM	11.2				39.2	
S0019AR	SS-08	41	246.89	SP	9.2					
S0019AR	MC-09	46	241.89	SP	7.2				4.5	
S0019AR	SS-12	60	227.89	SM					23.4	
S0019AR	MC-13	66	221.89	SM	13.7		NP	NP		
S0019AR	SS-14	71	216.89	SP-SM					12.6	
S0019AR	MC-15	76	211.89	ML	32.1		NP	NP		
S0020R	MC-04	11	267.21	SP-SM	6.3				14.2	
S0020R	SS-05	16	262.21	SM	7.6				26.1	
S0020R	MC-06	21	257.21	SM	33.3					
S0020R	SS-07	25	253.21	SM	19.3				27	
S0020R	SS-09	36	242.21	ML		24.1	21	3.1	90.7	
S0020R	SS-11	41	237.21	ML					89.3	
S0020R	MC-12	45.5	232.71	ML	19.7				72.6	
S0020R	MC-14	56	222.21	ML	16.6				77.2	
S0020R	MC-16	66	212.21	SP	6.9				2.9	
S0020R	SS-17	71	207.21	SP-SM	11.4				12.2	-
S0020R	MC-18	75.5	202.71	ML	24.7				88.5	
S0020R	SS-19	81	197.21	ML					55.6	
S0020R	MC-22	95.5	182.71	ML	23.4				96.3	
S0020R	SS-23	101	177.21	ML	20.4				75.6	



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>	Liquid Limt W <sub>I</sub>	Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0021R	B-01	0	274.17	SM	2.2				23.3	
S0021R	MC-02	6	268.17	SM	4.5					
S0021R	SS-03	11	263.17	ML	20.7				80.7	
S0021R	SS-05	21	253.17	SP-SM	17.3				11.3	
S0021R	MC-06	26	248.17	SP-SM	12.4				6.4	
S0021R	SS-07	30	244.17	SP-SM	16.8				7.2	
S0021R	MC-08	36	238.17	SM	10.9				45.5	
S0021R	MC-10	46	228.17	ML/SM	19.3				53.2	
S0021R	SS-11	51	223.17	SP-SM	11.9				14	
S0021R	SS-13	61	213.17	SP-SM	12.7				14.1	
S0021R	MC-14	65.5	208.67	SP-SM	13.6				5.3	
S0021R	MC-16	75.5	198.67	SP	7.2				4.3	
S0021R	SS-17	81	193.17	SP-SM	14.3				11.8	
S0021R	MC-18	86	188.17	SP	8.2				3.4	
S0028R	B-01	0	261.24	AC					12	
S0028R	B-02	5	256.24	SP-SM					12	
S0028R	SS-03	16	245.24	SP-SM	19.6				5	
S0028R	MC-04	21	240.24	ML	24.6		NP	NP		
S0028R	SS-05	25	236.24	SM					42	
S0028R	MC-06	30.5	230.74	CL	24.6				82	
S0028R	SS-07	36	225.24	CL		31	22	9		
S0028R	SS-11	56	205.24	SP-SM					13	
S0028R	MC-12	60.5	200.74	SP	12.3					
S0028R	SS-13	66	195.24	SP-SM					13	
S0028R	SS-17	81	180.24	ML					76	
S0028R	MC-18	86	175.24	SP-SM	9.9	_			_	
S0028R	SS-19	91	170.24	SM					18	



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>		Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0028R	MC-22	105.5	155.74	SM	21.7				48	
S0028R	MC-26	125.5	135.74	SP	19					
S0028R	SS-29	141	120.24	ML					81	
S0028R	MC-30	145.5	115.74	SM	18.3				43	
S0029R	B-01	0	260.07	SM					25	
S0029R	MC-03	10.5	249.57	SP-SM					5	
S0029R	MC-03	11	249.07	SP-SM	12.8					
S0029R	SS-04	16	244.07	SP	20.6				4	
S0029R	MC-05	21	239.07	SP	12.5					
S0029R	SS-06	26	234.07	ML					64	
S0029R	MC-07	30.9	229.17	SM	14.9				23.9	
S0029R	SS-08	36	224.07	ML					93	
S0029R	MC-09	40.5	219.57	CL	26.3					
S0029R	MC-09	41	219.07	CL	16.4	28	19	9		
S0029R	U-10	42	218.07	ML	19.7		NP	NP	57	
S0029R	SS-11	46	214.07	CL					97	
S0029R	MC-12	51	209.07	SM	23.9				46	
S0029R	SS-13	56	204.07	SP-SM	13.6				12	
S0029R	MC-14	61	199.07	SP-SM	12					
S0029R	SS-15	66	194.07	CL					91	
S0029R	SS-20	86	174.07	SM					41	
S0029R	SS-22	96	164.07	ML					70	
S0029R	MC-25	110.5	149.57	ML					71	
S0030R	B-01	0	257.95	SM	10.3				46.8	
S0030R	SS-02	6	251.95	ML	17.5				69.7	
S0030R	MC-03	11	246.95	SP	0.3					
S0030R	SS-04	16	241.95	SP-SM	19.4				7.7	



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>		Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0030R	SS-06	26	231.95	ML	24.1				91.8	
S0030R	MC-07	31	226.95	SM	7.7					
S0030R	SS-08	36	221.95	SP-SM	6.7				14	
S0030R	MC-10	42	215.95	CL-ML	25.8	19	13	6		
S0030R	MC-10	43	214.95	CL-ML	27.1					
S0030R	SS-11	45	212.95	SM					31.1	
S0030R	MC-14	60.8	197.15	CL-ML		14	8.8	5.2		
S0030R	MC-14	61.3	196.65	SC		24.7	20.2	4.5		
S0030R	MC-16	70.5	187.45	CL-ML	26.2	28	21.6	6.4		
S0030R	SS-19	86	171.95	SM	10.5				31.4	
S0031R	B-01	0	260.05	SP-SM	2.7				12.4	
S0031R	SS-02	6	254.05	SM	9.2				15.6	
S0031R	MC-03	10.5	249.55	SP	20.1				4.8	
S0031R	MC-03	11	249.05	SP	16.9					
S0031R	SS-04	16	244.05	SP-SM	19.6				5.9	
S0031R	MC-05	21	239.05	SP-SM	14					
S0031R	SS-06	26	234.05	SP-SM	18.2				7.2	
S0031R	MC-07	30.5	229.55	SM	15				25.2	
S0031R	SS-08	35	225.05	SM	14				24	
S0031R	MC-09	41	219.05	SM	8.6				26.9	
S0031R	MC-11	51	209.05	SP-SM	7				13.6	
S0031R	MC-13	61	199.05	SP-SM	17.8				5.2	
S0031R	SS-14	66	194.05	SP-SM	14.8					
S0031R	SS-16	76	184.05	ML/SM	22.5				50.4	
S0033AR	B-01	0	260.53	SM	5.5				37.9	
S0033AR	U-03	7.5	253.03	SM	16.8				45	
S0033AR	MC-04	11.5	249.03	SP	6.7					



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>	Liquid Limt W <sub>I</sub>	Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0033AR	MC-06	19	241.53	SP	17.6					
S0033AR	MC-07	21	239.53	SP	3.4					
S0033AR	SS-08	23.5	237.03	SP-SM	14.7				6	
S0033AR	MC-10	28.5	232.03	SP	13.7					
S0033AR	MC-13	36	224.53	ML	13.2					
S0033AR	MC-15	46	214.53	CL	13.8	24.2	15.5	8.7		
S0033AR	SS-16	50	210.53	ML	21		NP	NP	82	
S0033AR	MC-17	56	204.53	SP-SM	11.5				13.7	
S0033AR	SS-24	90.5	170.03	SM	11.7				30.4	
S0034BR	B-01	0	260.39	SM					49	
S0034BR	SS-02	6	254.39	SM					16	
S0034BR	MC-03	10.5	249.89	SP-SM	20.1				8	
S0034BR	MC-03	11	249.39	SP-SM	12.3					
S0034BR	MC-05	21	239.39	SP	5.2					
S0034BR	MC-07	30.5	229.89	CL-ML	15.5	24	20	4	54	
S0034BR	MC-09	41	219.39	SM					50.5	
S0034BR	SS-10	46	214.39	ML					69	
S0034BR	MC-11	51	209.39	ML	21.9				64	
S0034BR	MC-13	61	199.39	ML	19.8				75	
S0034BR	SS-14	66	194.39	SM					39	
S0034BR	SS-16	76	184.39	ML			NP	NP	74	
S0065R	B-01	0	193.81	SM						
S0065R	MC-02	6	187.81	SM	9.1					
S0065R	SS-03	11	182.81	SP-SM	9.8				8.6	
S0065R	MC-04	15.5	178.31	SP-SM	15.9				9.5	
S0065R	MC-04	16	177.81	SP-SM	9.6					
S0065R	SS-05	21	172.81	SP-SM	13.3				10.5	



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>	•	Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0065R	MC-06	25.5	168.31	SP-SM	15.3				14.6	
S0065R	MC-08	35.5	158.31	CL		31	14	17		
S0065R	MC-08	36	157.81	CL	20.9					
S0065R	U-10	42	151.81	CL		32	13	19	63	
S0065R	MC-11	45.5	148.31	ML		29.9	26.2	3.7		
S0065R	SS-12	51	142.81	SM	17.6				41.7	
S0065R	MC-13	55.5	138.31	SP	19.2				3.9	
S0065R	MC-17	75.5	118.31	ML	21.8		NP	NP		
S0065R	SS-18	81	112.81	ML					59.9	
S0066R	B-01	0	193.90	SM						
S0066R	MC-03	10	183.90	SM	16.3				32.3	
S0066R	SS-04	16	177.90	CL	15.3	30.7	17.7	13		
S0066R	MC-05	21	172.90	SM	20.2					
S0066R	SS-06	26	167.90	SM	13.7				45	
S0066R	SS-08	36	157.90	SP-SM	12.2				12.7	
S0066R	MC-09	40.5	153.40	CL-ML		26	20.5	5.5		
S0066R	MC-09	41	152.90	CL-ML	22.2					
S0066R	U-10	45	148.90	CL	18.4	33	16	17		
S0066R	MC-12	56	137.90	SP	25					
S0066R	SS-13	61	132.90	CL	18	31.8	19.7	12.1		
S0066R	MC-16	75.5	118.40	SP-SM	23.5				5	
S0066R	MC-18	86	107.90	SM	19.2					
S0067R	B-01	0	194.07	SP						
S0067R	U-03	11.5	182.57	SM					42	
S0067R	MC-04	15.5	178.57	CL	27.9	39	16	23		
S0067R	MC-04	16	178.07	CL	20					
S0067R	MC-05	21	173.07	SP-SM	22.1					



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>		Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0067R	MC-06	25	169.07	SP	18.1				3.9	
S0067R	MC-08	36	158.07	SP	15.9					
S0067R	SS-09	41	153.07	ML					71	
S0067R	MC-11	45	149.07	SC					16.4	
S0067R	MC-12	50.5	143.57	CL	23.6	32	22	10	76	
S0067R	U-15	63.5	130.57	CL	22.3	41	14	27		
S0067R	SS-19	81	113.07	CL	24.4	41	12	29		
S0067R	MC-23	95	99.07	SM					27.6	
S0067R	SS-24	101	93.07	ML					81	
S0067R	MC-26	110.5	83.57	SM	28.7				46	
S0067R	MC-28	120.9	73.17	CL	19.4	28	13	15		
S0067R	MC-30	131	63.07	CL	25.5					
S0067R	SS-31	136	58.07	CL	23.1	41	16	25	81	
S0068R	B-01	0	198.24	SM	6.4				42.2	
S0068R	MC-02	6	192.24	ML/SM	11.9				53	
S0068R	SS-03	11	187.24	ML/SM					52	
S0068R	MC-04	15.5	182.74	ML					60	
S0068R	MC-04	16	182.24	ML	15.7					
S0068R	MC-06	26	172.24	SM	14.5					
S0068R	SS-07	31	167.24	SP-SM	11.2				13.3	
S0068R	MC-08	35.5	162.74	CL		37	17	20		
S0068R	MC-08	36	162.24	CL	26.5					
S0068R	SS-11	51	147.24	ML	-				53.6	
S0068R	MC-12	55.5	142.74	SP-SM	17.4				5.5	
S0068R	SS-13	61	137.24	ML	21.5	35	28	7		
S0068R	MC-14	65.5	132.74	CL						
S0068R	U-15	67	131.24	CL	20.5	33	17	16		



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>	•	Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0068R	SS-16	71	127.24	CL	13.6	29.3	21.6	7.7		
S0068R	MC-17	75.5	122.74	CL	23.8					
S0068R	SS-18	81	117.24	SM/ML					46.9	
S0068R	MC-19	86	112.24	CL-ML	19.7					
S0068R	MC-23	105.5	92.74	ML	25.3		NP	NP		
S0068R	SS-24	111	87.24	SM					22.4	
S0068R	MC-29	135.5	62.74	ML	25.2	32.6	32.2	0.4	94.4	
S0068R	SS-30	141	57.24	ML	17.9					
S0068R	MC-31	146	52.24	ML	15.5				60.4	
S0069AR	B-01	0	189.29	CL		37.8	21.9	15.9		
S0069AR	MC-02	5	184.29	CL	15.5					
S0069AR	MC-02	6	183.29	SM	17.9				61.3	
S0069AR	MC-04	16	173.29	SP	4.8					
S0069AR	SS-05	21	168.29	CL	16.9	35.3	23	12.3		
S0069AR	MC-06	26	163.29	CL	19					
S0069AR	U-08	32.5	156.79	ML	17.3				55.9	
S0069AR	MC-09	36	153.29	CL-ML	20.3					
S0069AR	SS-10	41	148.29	ML					60.4	
S0069AR	U-11	42	147.29	CL	18.4	28	12	16		
S0069AR	MC-12	46	143.29	ML	20.9					
S0069AR	MC-14	56	133.29	SM	14.4				30.4	
S0069AR	SS-15	61	128.29	CL-ML		28.1	22.3	5.8		
S0069AR	MC-16	65	124.29	CL	19.1	30	13	17		
S0069AR	SS-17	71	118.29	CL	21.4	32.8	21.3	11.5		
S0069AR	MC-18	75	114.29	CL	20.9	37	18	19		
S0069R	B-01	0	191.93	CL					33.5	
S0069R	MC-02	5.5	186.43	CH	18.9	71	16	55		



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>		Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0069R	MC-02	6	185.93	CH	20.7					
S0069R	U-03	6.5	185.43	CH	34	54.2	19	35.2		
S0069R	U-03	7	184.93	CH						
S0069R	SS-03	11	180.93	ML	19.1				55.7	
S0069R	MC-04	15.5	176.43	CL	23.3	32.8	22.2	10.6		
S0069R	MC-04	16	175.93	CL	19.1					
S0069R	U-06	24	167.93	CL	18.5	23.5	19	4.5		
S0069R	SS-08	36	155.93	SM	15.3				37.8	
S0069R	MC-11	50.5	141.43	CL	22.7	27.5	17.6	9.9		
S0069R	MC-11	51	140.93	CL	19.4					
S0069R	SS-12	56	135.93	ML	18.2	32.2	23.7	8.5		
S0069R	SS-14	65	126.93	CL					42.7	
S0069R	MC-15	70.5	121.43	SM	19.6				21.4	
S0069R	SS-18	86	105.93	SM/ML					51.7	
S0069R	SS-20	96	95.93	SM	15.4				19.7	
S0070R	B-01	0	194.42	ML		27.9	22.6	5.3		
S0070R	MC-02	6	188.42	CL	27.5					
S0070R	SS-03	11	183.42	ML	20.5				61.9	
S0070R	U-05	20	174.42	SM					30.8	
S0070R	U-05	21	173.42	SM	12.7					
S0070R	SS-06	26	168.42	ML	16.9				62.9	
S0070R	MC-07	31	163.42	SM	11.9					
S0070R	SS-08	36	158.42	SC	12.4				40.2	
S0070R	MC-09	40.5	153.92	SM					39.4	
S0070R	MC-09	41	153.42	SM	22.6					
S0070R	SS-10	46	148.42	CL-ML		26.9	20.2	6.7		
S0070R	MC-11	51	143.42	SP	18.7			_		



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>		Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0070R	SS-12	56	138.42	ML		35.2	26.3	8.9		
S0070R	MC-13	61	133.42	CL	25					
S0070R	MC-15	70.5	123.92	CL	25.4				73.8	
S0070R	SS-16	76	118.42	CL-ML	18.6				73.2	
S0070R	MC-17	81	113.42	CL	29.5					
S0070R	SS-21	96	98.42	ML		38.7	29.4	9.3		
S0071R	B-01	0	192.22	CL						
S0071R	SS-02	6	186.22	CH	25	70	17	53		
S0071R	MC-03	10.5	181.72	CL	27.7	48	20	28		
S0071R	SS-04	16	176.22	ML					64	
S0071R	MC-05	21	171.22	SM	22.1					
S0071R	SS-06	26	166.22	SM					14	
S0071R	MC-07	30.5	161.72	CL		42	14	28		
S0071R	MC-07	31	161.22	CL	21.3	39	15	24		
S0071R	SS-08	36	156.22	SM					30	
S0071R	MC-09	41	151.22	CL	22.7					
S0071R	SS-10	46	146.22	SP-SM					14	
S0071R	MC-11	51	141.22	SP	14.5					
S0071R	MC-13	60.5	131.72	SP	15.1					
S0071R	SS-14	66	126.22	SM/ML					47	
S0071R	SS-16	76	116.22	SM/ML					45	
S0071R	MC-17	81	111.22	CL	22.5					
S0071R	MC-19	90.5	101.72	CH		58	17	41		
S0071R	MC-19	91	101.22	CH	28.7					
S0071R	SS-20	96	96.22	CH					93	
S0071R	MC-23	110.5	81.72	CH	34.1	63	16	47		
S0071R	MC-23	111	81.22	CH	31.3			_		



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>	Liquid Limt W <sub>I</sub>	Plastic Limit w <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0071R	SS-24	116	76.22	ML					85	
S0071R	MC-25	122.5	69.72	СН	35.3	51	19	32		
S0071R	MC-25	123	69.22	СН						
S0071R	SS-26	126	66.22	СН						4.65
S0071R	MC-27	131	61.22	СН	28	51	16	35		
S0071R	SS-30	146	46.22	CL	25.8	43	18	25		
S0072R	B-01	0	196.00	SM					39	
S0072R	B-03	7	189.00	SM					37	
S0072R	MC-04	11	185.00	SP	18					
S0072R	U-05	13	183.00	CL	24	36	12	24		
S0072R	MC-06	21	175.00	CL	15.8					
S0072R	SS-07	26	170.00	SP-SM					13	
S0072R	MC-08	30.5	165.50	СН	25.8	53	18	35		
S0072R	MC-08	31	165.00	CH	17.8					
S0072R	MC-10	40.5	155.50	CL	18	30	15	15		
S0072R	MC-10	41	155.00	CL	21.6					
S0072R	SS-11	46	150.00	ML					57	
S0072R	MC-12	51	145.00	ML/SM					50.8	
S0072R	SS-14	61	135.00	SM					28	
S0072R	SS-15	66	130.00	CL	18.7	43	14	29		
S0072R	U-16	70	126.00	SM	16.9				33	
S0072R	MC-17	76	120.00	ML	18.6				58	
S0072R	U-18	80	116.00	CH	25.9	53	16	37		
S0072R	SS-19	86	110.00	CH	18.4	64	16	48		
S0072R	MC-20	91	105.00	CH	17					
S0072R	SS-21	96	100.00	ML					58	
S0072R	MC-22	100.5	95.50	СН	30.6	_				



**Table E-2**Summary of Laboratory Index Test Results

Borehole ID	Sample No.	Test Depth	Elevation (NAVD88)	USCS Group	Moisture Content, W <sub>o</sub>		Plastic Limit W <sub>p</sub>	Plasticity index I <sub>p</sub>	Percent Fines	Organic Content
		(ft)	(ft)		(%)	(%)	(%)	(%)	(%)	(%)
S0072R	MC-22	101	95.00	CH	32.4	50	21	29		
S0072R	U-23	105	91.00	CH	33.1	60	17	43		
S0072R	MC-24	110.5	85.50	ML					99	
S0072R	MC-24	111	85.00	ML	27.1					
S0072R	SS-25	116	80.00	ML					65	
S0072R	MC-26	120.5	75.50	ML					92	
S0072R	SS-29	136	60.00	ML					98	
S0072R	MC-30	141	55.00	CL-ML	29.4					
S0073R	B-01	0	213.00	CL-ML						
S0073R	MC-02	5.5	207.50	ML	28.4	38.6	36.2	2.4		
S0073R	MC-02	6	207.00	ML						
S0073R	SS-03	11	202.00	CL	25.9	31.1	24.5	6.6		
S0073R	U-04	12	201.00	CL	21.6					
S0073R	MC-05	16	197.00	CL	20.4	33	23	10		
S0073R	MC-07	26	187.00	ML	19.4		NP	NP		
S0073R	SS-08	31	182.00	ML	18.2	27.4	25.2	2.2		
S0073R	SS-10	41	172.00	ML	16.6	34.7	30.5	4.2		
S0073R	MC-11	45.5	167.50	ML					81.4	
S0073R	MC-11	46	167.00	ML	25.6					
S0073R	SS-12	51	162.00	SM	18.9				42.3	
S0073R	MC-15	65.5	147.50	CH	25.3	67	22	45	91	
S0073R	MC-15	66	147.00	CH	22.3			_		
S0073R	SS-16	71	142.00	MH	21.1	61.1	47.2	13.9		



**Table E-3**Summary of Modified Proctor Results

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation	
Maximum Dry Unit Weight	ASTM D 1557	17	113.4 to 128.9	122	4	
Optimum Moisture Content	A31W D 1997	17	7.4 to 14.4	10	2	



**Table E-4**Summary of California Bearing Ratio Tests

Test	Test Reference	No. of Tests	Range of Values	Mean Value	Standard Deviation
California Bearing Ratio	ASTM D 1883	6	2.3 to 48	19	17

